

# Duke Energy Generator Interconnection

Queue Reform Stakeholder Meeting #3

June 18, 2019



# Agenda

Topic	Presenters	Time
Meeting Safety & Logistics	Duke Energy/Onsite Safety Rep	9:00 – 9:05
Overview of Duke Energy's Queue Reform Initiative, High-level Agenda	Navigant	9:05 – 9:15
SH2 Recap and SH3 details to be shared	Duke Energy	9:15 – 9:45
FAQ Presentation and Benchmarking	Navigant	9:45 – 10:15
Break		10:15 – 10:30
Duke QR SH # 3 Presentation- Cluster Process Exemption, Milestones Payments and Refunds, Cost Allocation, Transition Plan	Duke Energy	10:30 – 11:30
Lunch		11:30 – 12:30
Breakout Session Expectations, Group Formation	Navigant	12:30-2:15
Break		2:15- 2:30
Reconvene, summaries, next steps		2:30 – 3:00

# SAFETY

# Ground Rules

- All Stakeholder Group meetings, webinars and information exchange are designed solely to provide an open forum or means for the expression of various points of view in compliance with antitrust laws.
- Under no circumstances shall Stakeholder Group activities be used as a means for competing companies to reach any understanding, expressed or implied, which tends to restrict competition, or in any way, to impair the ability of participating members to exercise independent business judgment regarding matters affecting competition or regulatory positions.
- Proprietary information shall not be disclosed by any participant during any group meetings. In addition, no information of a secret or proprietary nature shall be made available to Stakeholder Group members.
- All proprietary information which may nonetheless be publicly disclosed by any participant during any group meeting shall be deemed to have been disclosed on a non-confidential basis, without any restrictions on use by anyone, except that no valid copyright or patent right shall be deemed to have been waived by such disclosure.

# Guiding Principles

- Effective processing of interconnection requests is fundamental to facilitating development of additional renewable resources
- Stakeholder input provides valuable insight to guide queue reform process development
- Other regions undergoing queue reform provides valuable insights and lessons learned
- Proposed changes must conform with applicable law and regulations
- Proposed process changes must be developed and administered in a fair, objective, and expeditious manner

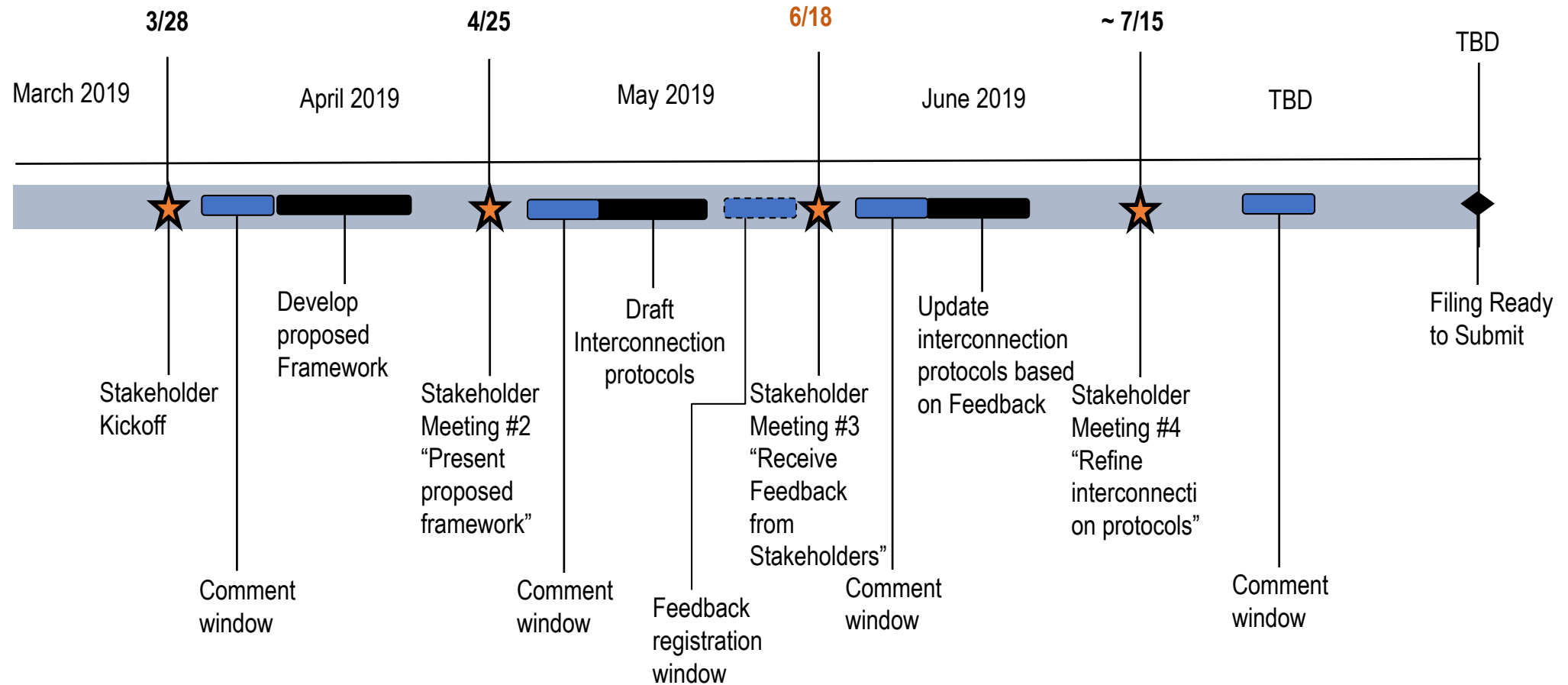
# Charter

- The Interconnection Reform Stakeholder Process will examine existing queue processes and suggest modifications for improving efficiency and effectiveness, including the development of a proposal for a grouping study process.
- Duke Energy and stakeholders will consider industry best practices and any specific regional requirements in developing proposed changes that position the Companies to facilitate achievement of future renewable energy policy objectives.

# Logistics

- Today's presentation will be distributed
- Clarifying questions will be answered at the end of each section
- We will collect questions throughout the day
  - We will collect feedback cards throughout the day
  - We will collect questions from those attending in person, by phone and by Webex
- We will take a morning break and a lunch break
- Afternoon facilitated session to receive additional feedback and comments

# 2019 Queue Reform Stakeholder Process Timeline\*



\*This timeline may be adjusted based on filing requirements

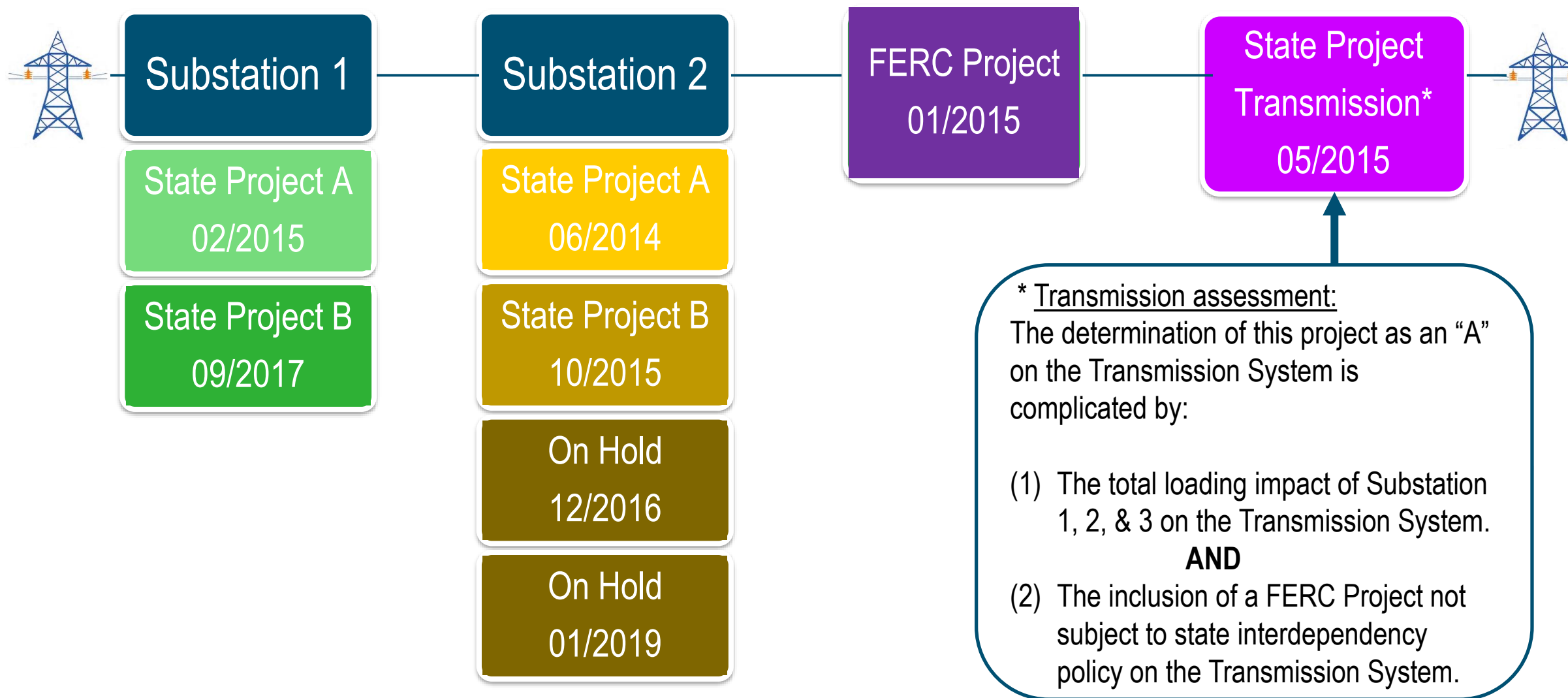


# RECAP

# Current State: A Case for Queue Reform

<b>Growing Queue</b>	The increasing size of the interconnection queue is creating challenges for both Duke Energy and developers that are not readily solvable under the existing processes
<b>Increasing Interdependencies</b>	Solar penetration levels are increasingly resulting in interdependencies between transmission and distribution requests as well as FERC and State projects.
<b>Network Upgrades Increasingly Triggered</b>	Due to the level of successful interconnections achieved to date, interconnection requests are becoming increasingly likely to trigger substantial network upgrades.
<b>Cost Sharing Mechanism</b>	The existing serial process prevents developers from sharing costs when large upgrades are required creating both market and system congestion
<b>Growing Interest in Cluster Studies</b>	Support is growing amongst utilities and FERC to move to a “first ready/first served” policy in managing the SGIP and LGIP queue process

# Current State: Interconnection Queue Interdependency Example



# Interconnection Queue Reform Objectives

- Increase efficiency of interconnection process and reduce size of interconnection queue
- Meet North Carolina (NC) commitment to pursue queue reform and propose workable framework
- Explore a common interconnection planning study approach for FERC jurisdictional and State jurisdictional projects
- Align the rules and workflows by which both transmission and distribution level projects are assessed
- Develop an improved interconnection process by removing bottlenecks that cause queue backlogs
- Continue to ensure reliable and safe transmission and distribution systems that comply with NAESB, FERC, NERC, NESC, NEC, NC, SC, and FL standards

# QUEUE REFORM FRAMEWORK

# Proposed Future State: T&D Cluster Study Benefits



## Process Improvement

- Process all interconnection requests simultaneously included in one cluster on a concurrent basis
- Efficiently identify, coordinate, and process projects that do not adversely impact the Duke T&D systems

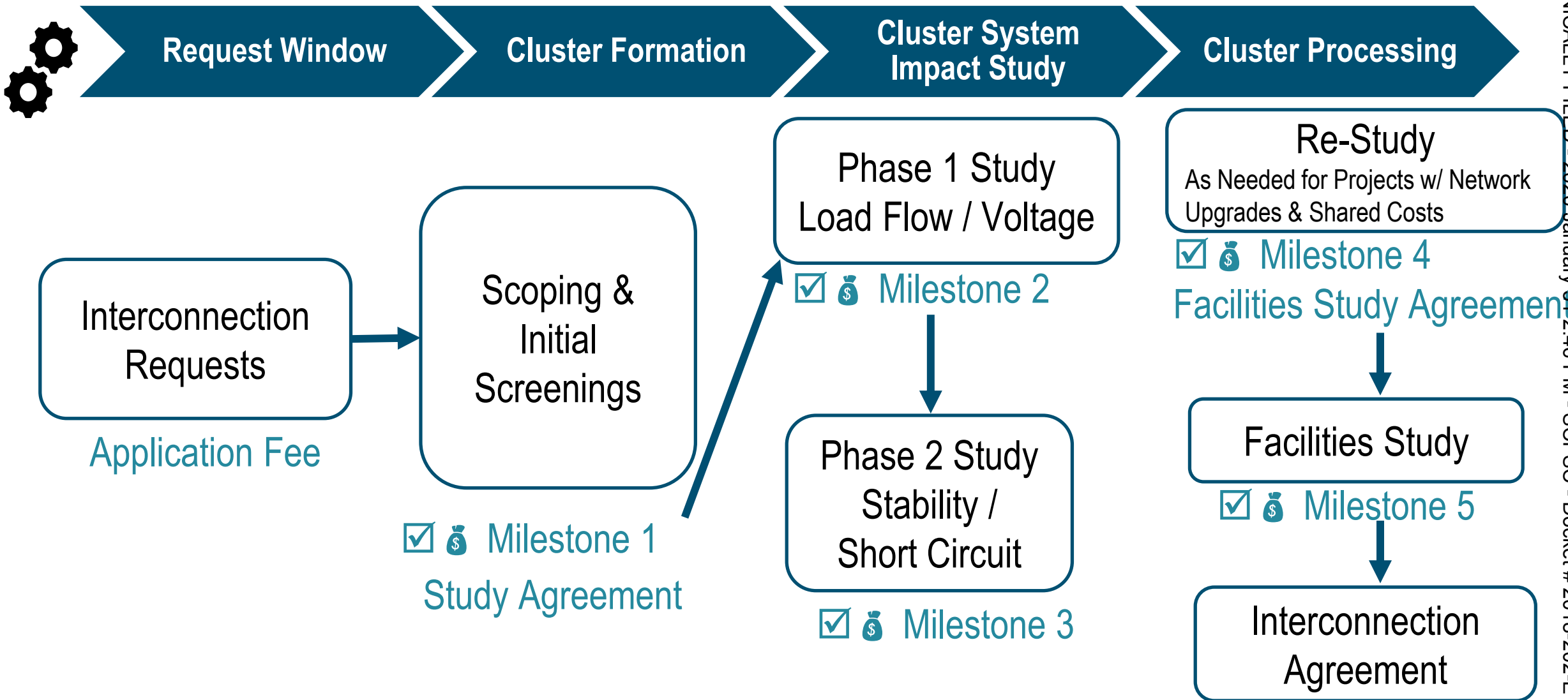
## T&D Alignment

- Evaluate the impacts of Distribution connected projects on distribution facilities, providing more streamlined coordination of distribution upgrades
- Develop an improved process for assessing the impacts of Transmission and Distribution connected projects on transmission facilities and provide more efficient coordination of transmission upgrades

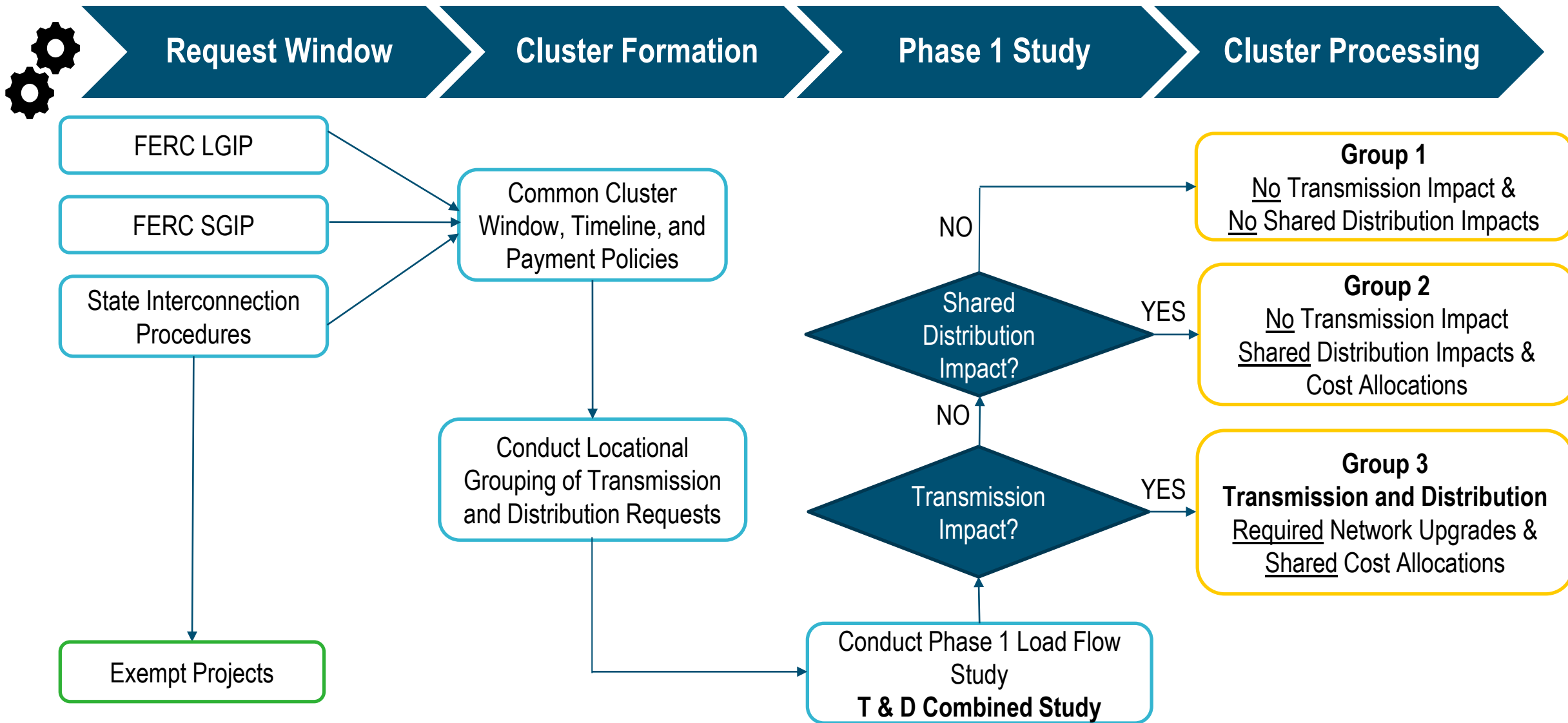
## Equitable Cost Allocation

- Equitably assign costs to projects (transmission and distribution) in the cluster study based on the relative impact of a project on a given facility that requires an upgrade

# Proposed Future State: Cluster Study Processing










# Proposed Future State: Cluster Study Processing (cont'd)





# Proposed Future State: Cluster Study Timeline

	Year 1												Year 2												Year 3				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
Study Enrollment Window Closes																													
Cluster Formation	30	 <i>M1</i>																											
Scoping Meeting		60																											
Phase 1 Study			120				 <i>M2</i>																						
Scoping Meeting							60																						
Phase 2 Study										150					 <i>M3</i>														
Scoping Meeting															60														
Phase 3 - Restudy										<i>Expedited SIS (Group 1&amp;2)</i>					150					 <i>M4</i>									
Scoping Meeting															<i>If needed</i>										60				
Facility Study										90			 <i>M4</i>														90		
Payment / IA													30														30		

 Milestone / Key Decision Point

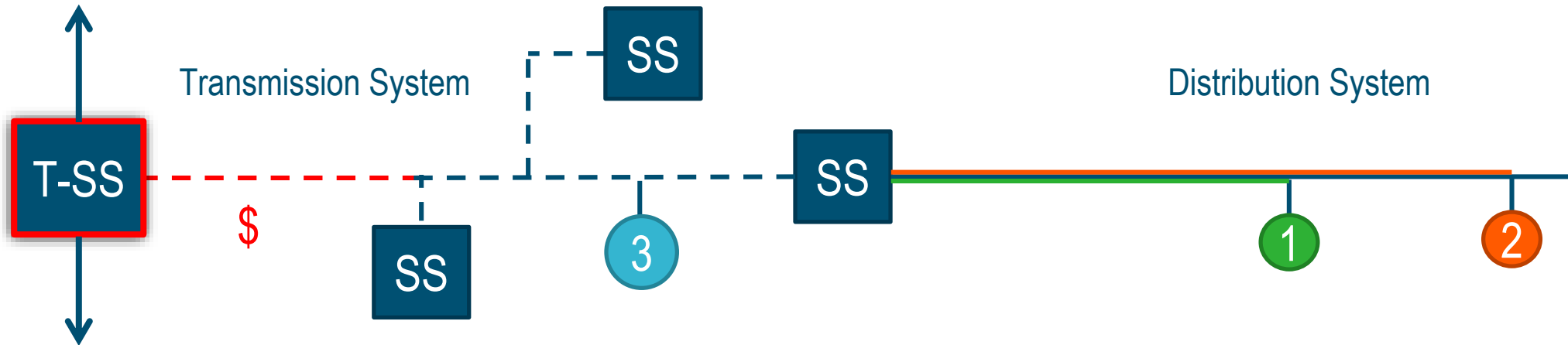
# Cost Allocation Example



Project	Size (kW)	Upgrade Required	Serial Study Upgrade Cost	Upgrade Required	Grouping Study Upgrade Cost
A	5000	None	\$0	Reconductor from A to SS	$\$500k = (5/7^*) \times \$700k$
B	2000	Reconductor <b>entire</b> line	\$800k	Reconductor from B to SS	$\$300k = \$100k + (2/7^*) \times \$700k$

\* Project Size Ratio

# Cost Allocation Example – Phase 1 Study Report



Project 1	Facility Contribution	Estimated Upgrade Cost	Milestone 2 Payment
<b>Total Estimated Upgrades</b>		<b>\$750,000</b>	<b>\$295,000</b>
<b>Transmission / Network Upgrades</b>		<b>\$150,000</b>	<b>\$45,000</b>
-Reconductor 115kV line, x miles	8%	\$50,000	
-Transmission 230kV substation upgrade	5%	\$100,000	
<b>Distribution System Upgrades</b>		<b>\$500,000</b>	<b>\$150,000</b>
-Reconductor 24kV line	62.5%	\$500,000	
<b>Interconnection Facilities</b>	100%	<b>\$100,000</b>	<b>\$100,000</b>

# Focus of Stakeholder Meeting #3

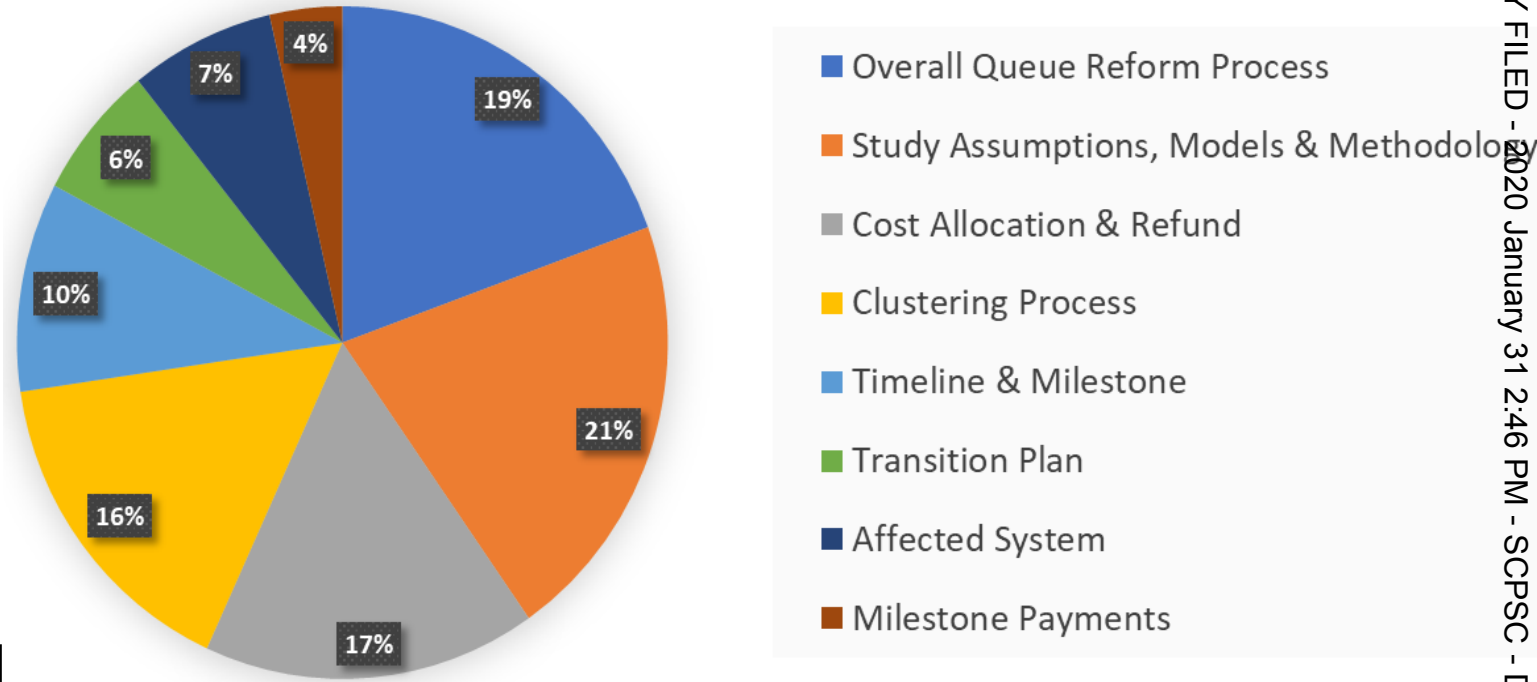
- **FAQ Responses and Stakeholder Feedback**
- **Cluster Process Exemption**
- **Studies Conducted**
  - Transmission
  - Distribution
- **Milestones Payments and Refunds**
  - State Interconnection Requests
  - FERC Interconnection Requests
  - Refund Policy By Upgrade Type
- **Cost Allocation**
  - Transmission
  - Distribution
- **Serial to Cluster Transition Plan**

# FREQUENTLY ASKED QUESTIONS

# Recap and Response

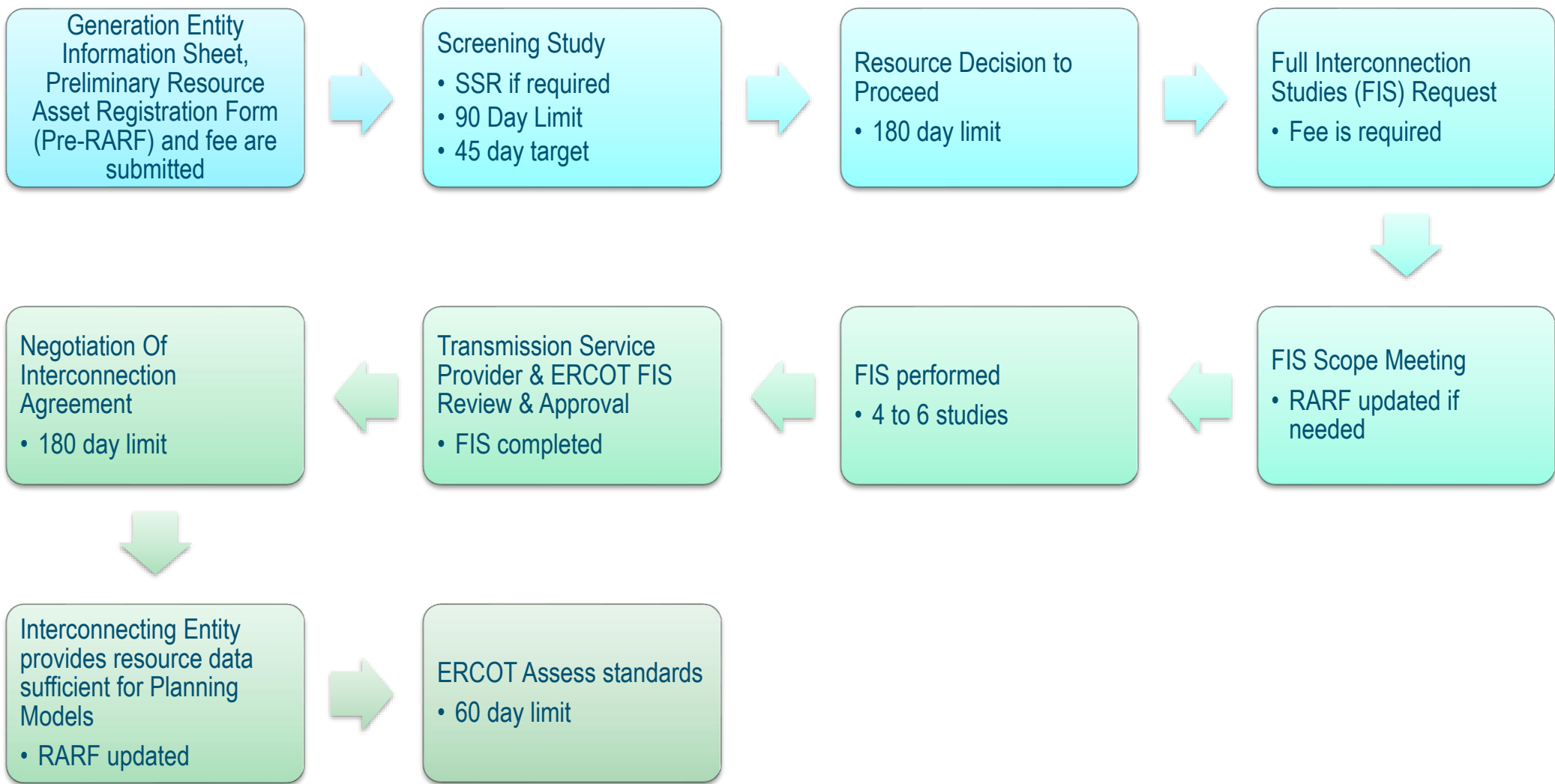
- Stakeholder #2 presented
  - Queue Reform Framework
  - Benchmarking
  - Timeline and Milestones
  - Cost Allocation Approach
- Several comments received were processed into various categories
- Common comments and questions were addressed in Frequently Asked Questions. Posted in the location below:
- Link: [SM#2 Frequently Asked Questions](#)

**Stakeholder Comments by Categories**



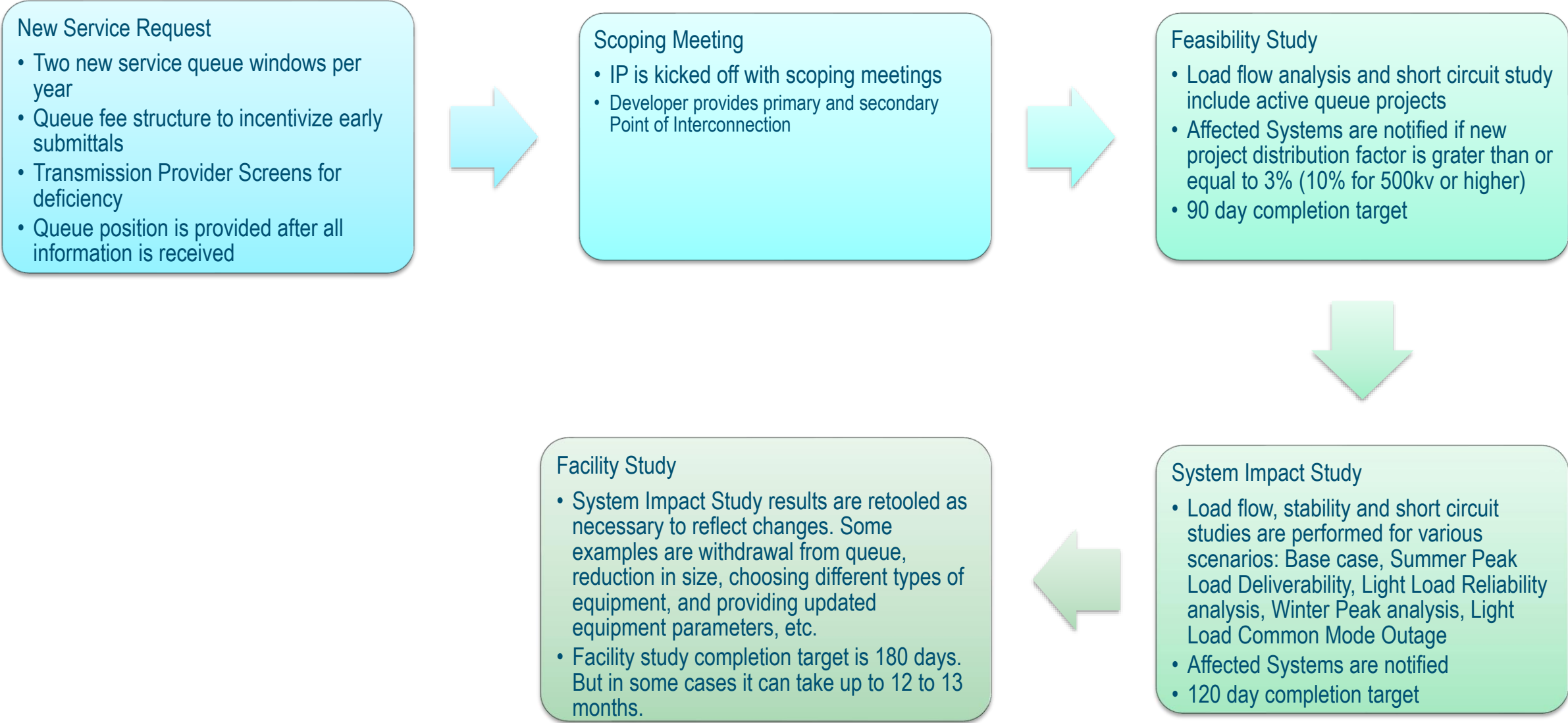
# BENCHMARKING

# ERCOT Interconnection Studies Overview













# PJM Interconnection Studies Overview



BREAK

# CLUSTER STUDY PROCESS FRAMEWORK

# Proposed Future State: Cluster Study Timeline

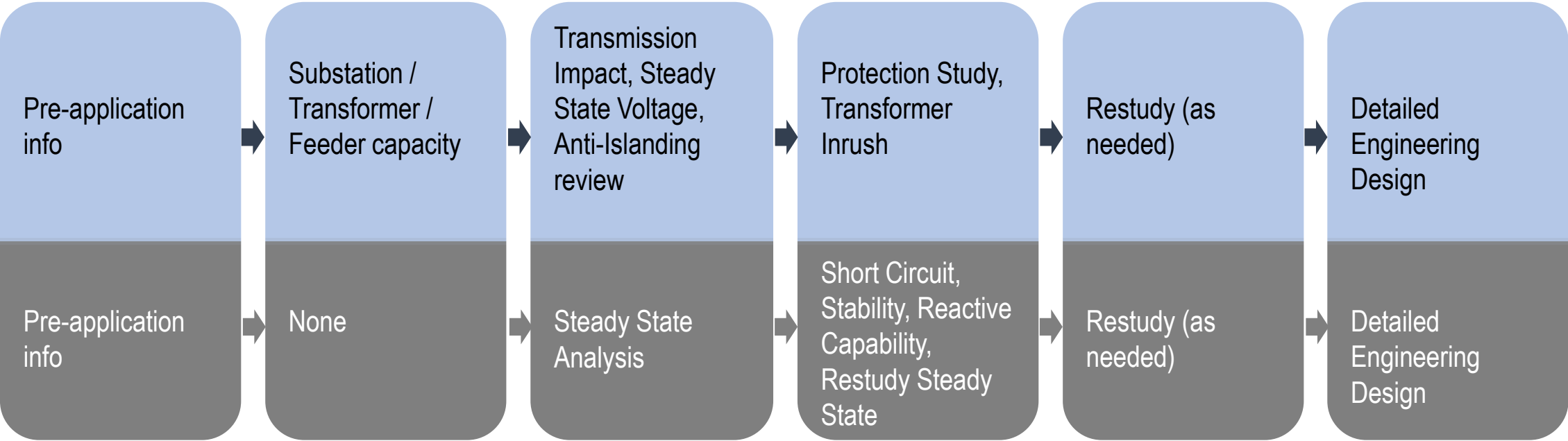
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 Milestone / Key Decision Point

# Cluster Study Exemption Guidelines

Connection Type	Project Size	Exempt From Cluster Study Process	Exempt from Transmission Study	Study Type
All	≤ 30 kW	Yes	Yes	30 kW Inverter Process
Power Purchase / Sell All	> 30 kW ≤ 100 kW	Yes	Yes	Serial study
	> 100 kW ≤ 250 kW	No	Yes	Distribution group study
	> 250 kW	No	No	Combined T & D study
Net Metering	> 30 kW ≤ 250 kW	Yes	Yes	Serial study
	> 250 kW ≤ 1000 kW	No	Yes	Distribution group study
	> 1000 kW	No	No	Combined T & D study

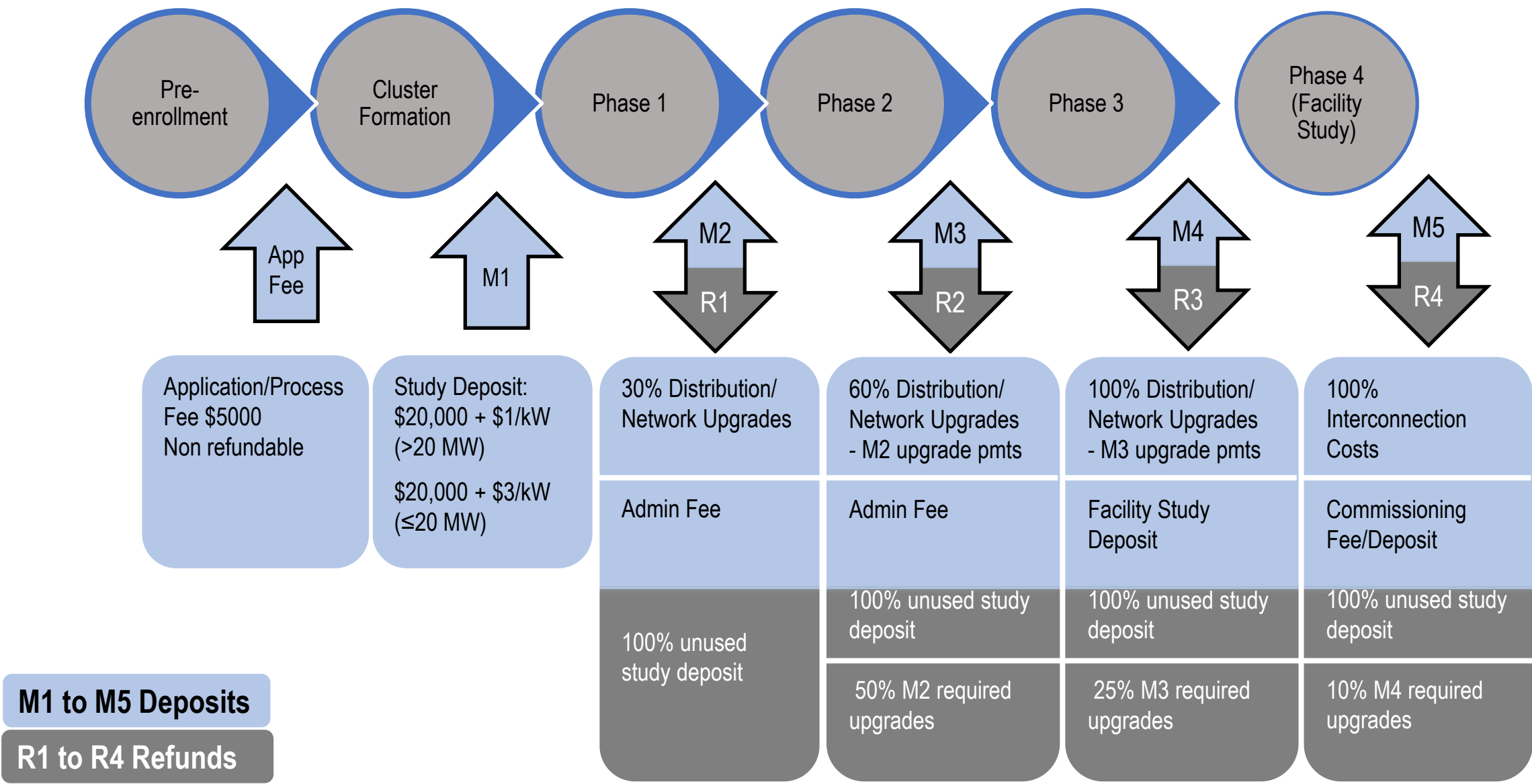
# Studies Conducted



Distribution (D) SIS Screen/Study

Transmission (T) SIS Screen/Study

# Milestones and Refunds



# Refund Policy

Network Upgrade Deposits	<ul style="list-style-type: none"><li>• Refunded if the facilities are not required for the remaining entities in the cluster</li></ul>
Substation upgrade Deposits	<ul style="list-style-type: none"><li>• Refunded if not required or constructed</li></ul>
Interconnection Upgrade Deposit	<ul style="list-style-type: none"><li>• System upgrades and interconnection facilities that are assigned solely to a withdrawing interconnection customer will be refunded</li></ul>

## Schedule

- FERC refund amounts will likely be different than refunds for State IRs
- FERC projects which withdraw prior to interconnection agreement will be refunded for required/constructed Facilities on the same schedule as the cluster participants which progress to commercial operation
- All other upgrade payments will be refunded in accordance with the Milestone/Refund Schedule



# COST ALLOCATION

PROJECTS  
ELECTRONICALLY FILED - 2020 January 31 2:46 PM - SCPSC - Docket # 2018-202-E - Page 34 of 217



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ELECTRONICALLY FILED - 2020 January 31 2:46 PM - SCPSC - Docket # 2018-202-E - Page 34 of 217

# Network Upgrade Cost Allocation - Example

Upgrade Cost = \$50 Million      Rating of the line = 200 MVA

	A	B	C	D	E	F	Total
Generator Rating (MW)	100	200	400	750	5	1	
MW Impact	4	6	10	20	1	0.5	41.5 MW
% of Cost Allocation = MW Impact/Total MW	9.64%	14.46%	24.10%	48.19%	2.41%	1.20%	100%
Allocation cost of upgrade in millions = % Cost Allocation × Upgrade Cost	\$4.82	\$7.23	\$12.05	\$24.10	\$1.20	\$0.60	\$50 Million

- All generation will pay the assigned upgrade cost based on the entities percent of the total impact
- Exceptions to cost sharing: generation with less than 3% impact on the facility based on the generation rating and a less than 1% impact based on the facility rating.

# Distribution Upgrade Cost Allocation

Transformer/Substation Bank Upgrades	Per MW basis
Distribution Line Work (e.g. reconductor)	Per MW basis, based on location (% use of upgrade) <ul style="list-style-type: none"><li>• Example provided during Stakeholder Presentation #2 on 4/25/19</li></ul>
Distribution System Protection Upgrades	Per count of projects on feeder
Relaying Upgrades for Anti-Islanding Protection	Per count of projects on substation
Communication Medium for Anti-Islanding Protection	Per count of projects, based on location (% use of upgrade)
Interconnection Facilities	Per count of projects

# SERIAL TO CLUSTER TRANSITION

# Serial to Cluster Transition - Objectives

- Provide options for IRs currently close to completion in the serial interconnection process to complete SIS and proceed to IA via serial process or join Transition Cluster
- Provide an option for all IRs currently in the serial queue to join a Transition Cluster
- Consider earlier queued IRs serial position during Transition process
  - For example, do not include all IRs into one cluster study (SH#2 feedback)
- Fully transition from serial queue before starting Cluster #1
- Develop a Transition cluster study process that:
  - Can be executed efficiently and prevent delay of implementing new Cluster Study Process
  - Provide cost sharing opportunities for IRs in areas of high VER penetration
  - Provide definitive decision points and milestones
  - Will be supported by FERC

# Serial to Cluster Transition - Eligibility

Project SIS status (effective date)	Next step / options	Decision Timing (as of effective date)
SIS Completed	<ol style="list-style-type: none"> <li>1. Proceed to IA</li> <li>2. Withdraw</li> </ol>	45 calendar days
SIS in Progress	<ol style="list-style-type: none"> <li>1. Complete SIS                         <ol style="list-style-type: none"> <li>1. Proceed to IA</li> <li>2. Transition cluster</li> <li>3. Withdraw</li> </ol> </li> <li>2. Transition cluster</li> <li>3. Withdraw</li> </ol>	45 calendar days initial decision SIS completed within 90 calendar days 45 calendar days, final decision
Projects On Hold	<ol style="list-style-type: none"> <li>1. Transition cluster</li> <li>2. Withdraw</li> </ol>	45 calendar days
Interim SIS	<ol style="list-style-type: none"> <li>1. Transition Cluster</li> <li>2. Withdraw</li> </ol>	45 calendar days

# Transition Cluster Details

## Transition Cluster Definition

- The proposed Transition process will be executed through up to four discrete temporal T&D cluster studies.
- Each Transition cluster study will consist of a two-phase study process.
- Corresponding Distribution studies will be completed during the 1<sup>st</sup> phase, unless restudies are warranted during Phase 2.
- Each transition cluster SIS is estimated to take 210 days from the start of the study until the facility study agreements are signed.

## Transition Cluster Participation Requirements

- Projects joining a Transition Cluster will forfeit their Queue Number.
- Projects that withdraw from the Transition Cluster will not be eligible to join another Transition Cluster, but may elect to enroll in Cluster #1.

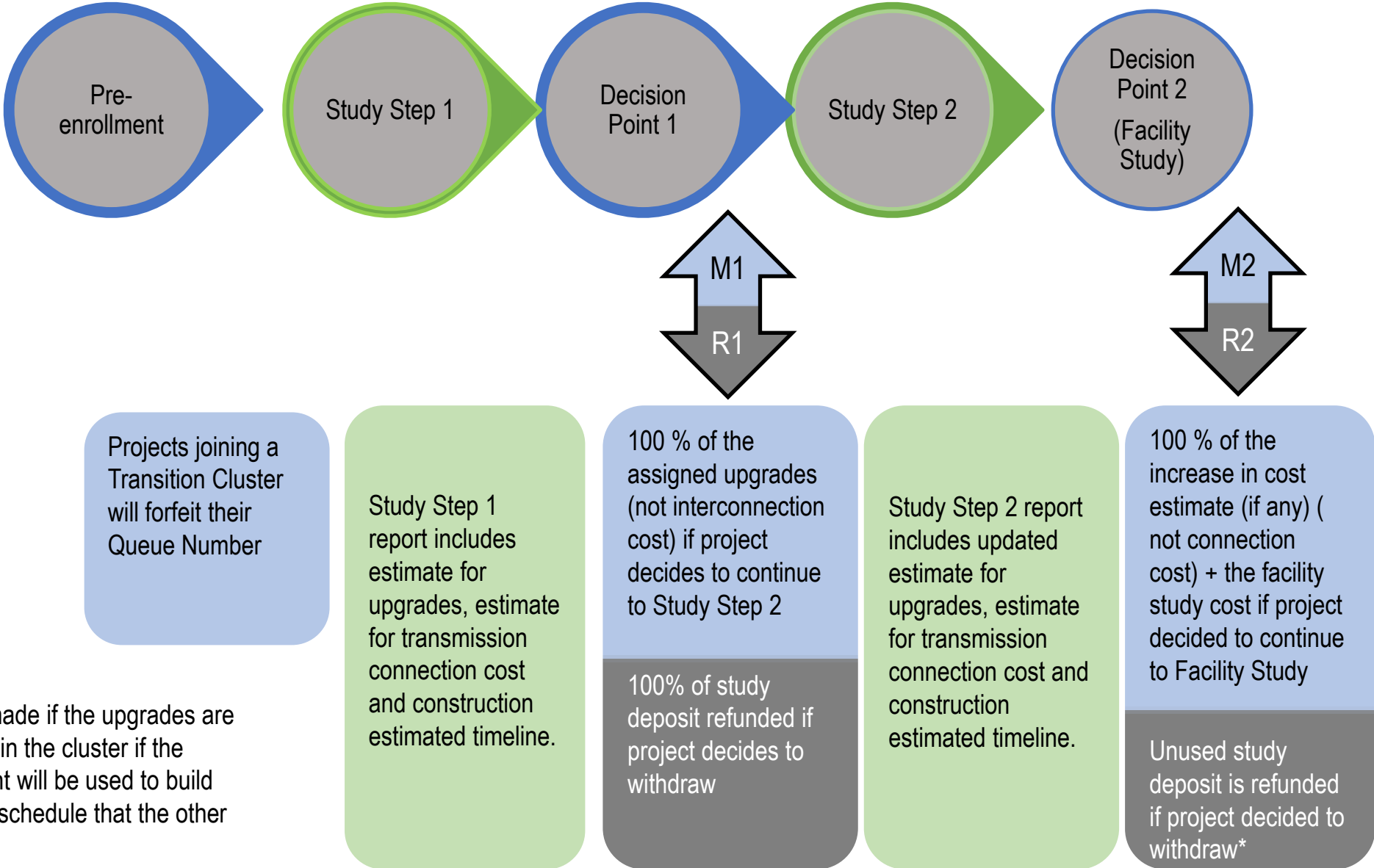


# Milestones and Refunds – Transition Plan

M1 to M5 Deposits

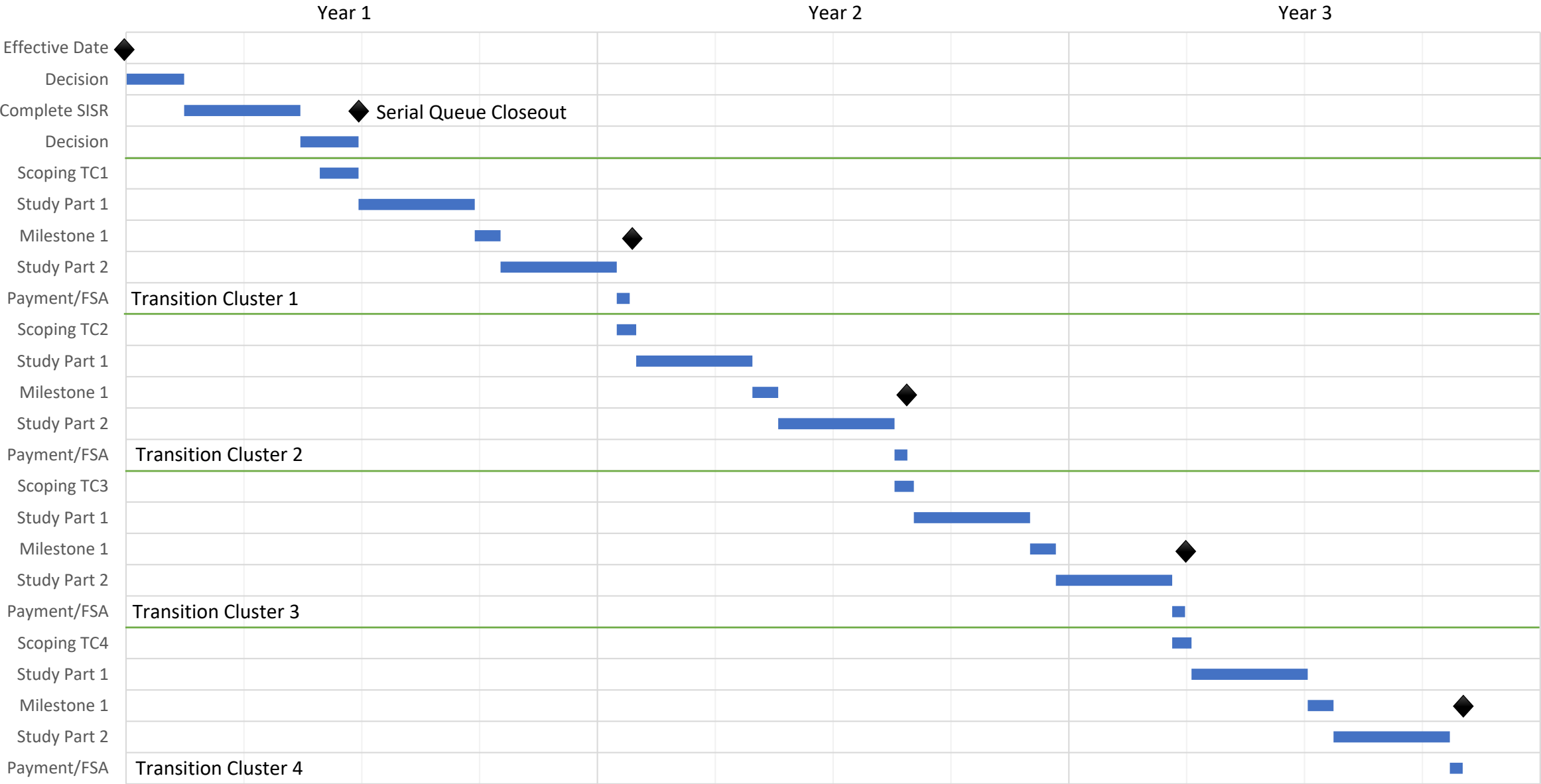
R1 to R4 Refunds

Study Report

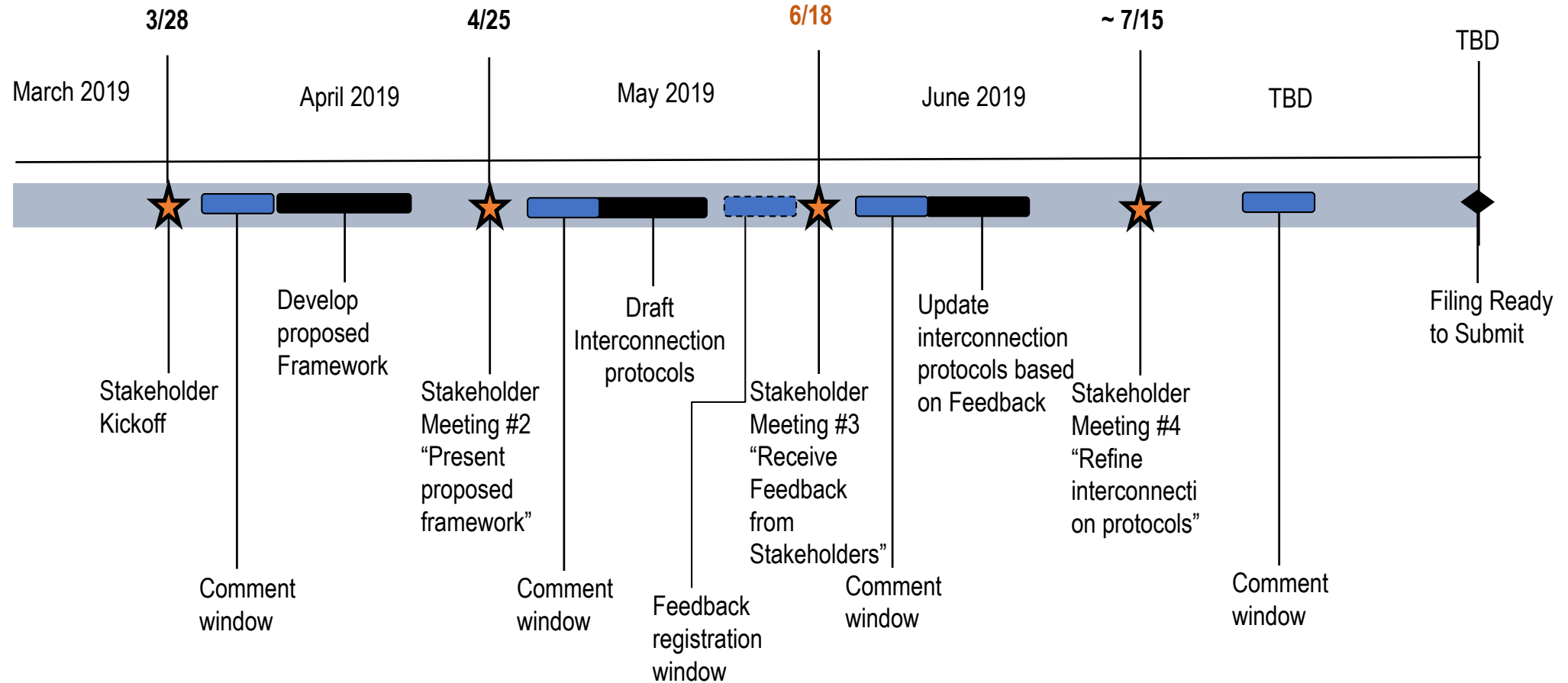


\*Refund of upgrade payment will be made if the upgrades are not required for the remaining entities in the cluster if the upgrades are required the M2 payment will be used to build the Facilities and be refunded on the schedule that the other generators go commercial.

# Overall Transition Plan Timeline – Critical Path



# 2019 Queue Reform Stakeholder Process Timeline\*



\*This timeline may be adjusted based on filing requirements

LUNCH

# Agenda

Topic	Presenters	Time
Meeting Safety & Logistics	Duke Energy/Onsite Safety Rep	9:00 – 9:05
Overview of Duke Energy's Queue Reform Initiative, High-level Agenda	Navigant	9:05 – 9:15
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Breakout Session Expectations, Group Formation	Navigant	12:30-2:15
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Reconvene, summaries, next steps		2:30 – 3:00

# BREAKOUT SESSION

# Breakout Session Guidance

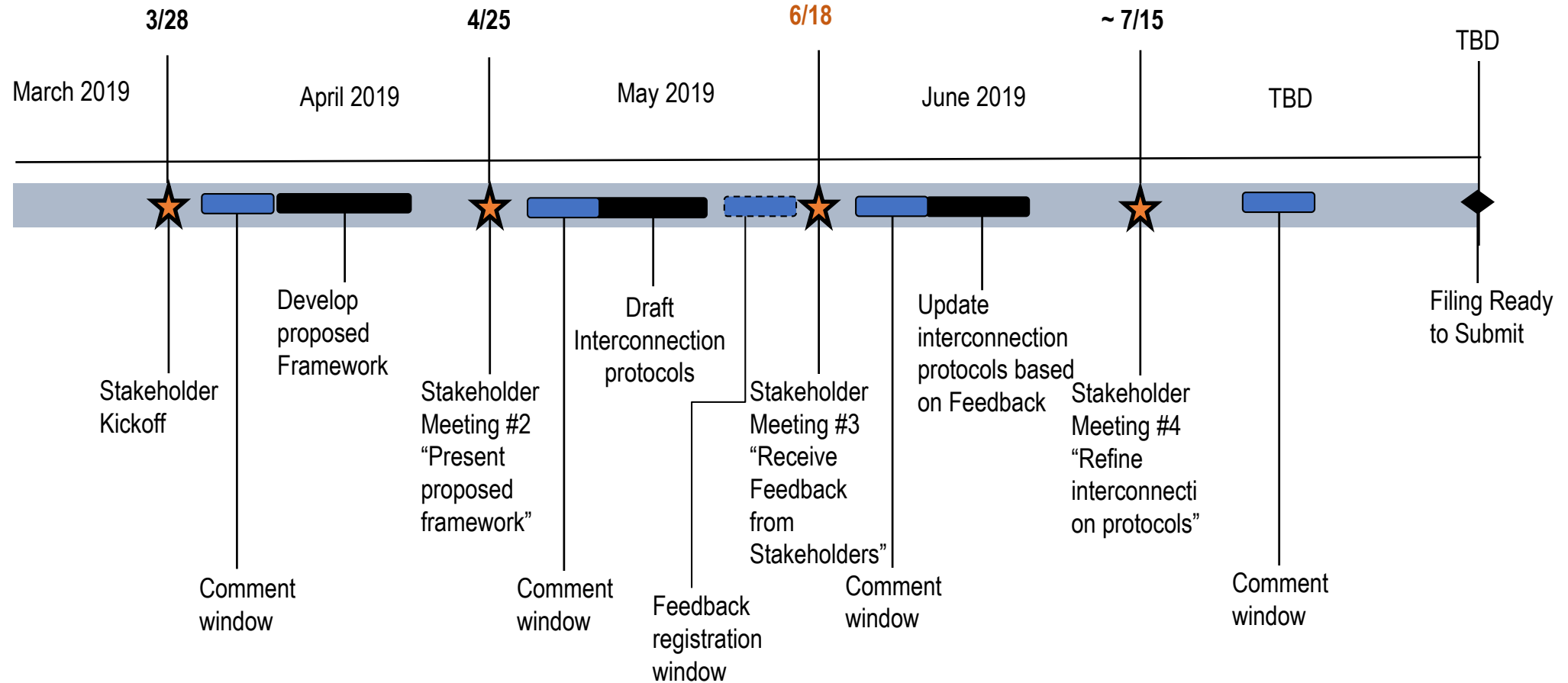
- Purpose: To capture feedback that will assist Duke's ongoing efforts in building a future state framework benefitting stakeholders
- Feedback on the following topics will be captured in today's sessions:
  - Cluster Process Exemption
  - Studies Conducted
  - Milestones Payments and Refunds
  - Cost Allocation
  - Serial to Cluster Transition Plan

# Stakeholder Feedback Form

Topic	Stakeholder	Comments	Proposals



# 2019 Queue Reform Stakeholder Process Timeline\*



Stakeholder Meeting



Stakeholder Comment window

\*This timeline may be adjusted based on filing requirements

# APPENDIX

# FERC Definitions

## ■ Current terms defined per the LGIP/LGIA :

- **Interconnection Facilities** shall mean the Transmission Provider's Interconnection Facilities and the Interconnection Customer's Interconnection Facilities. Collectively, Interconnection Facilities include all facilities and equipment between the Generating Facility and the Point of Interconnection, including any modification, additions or upgrades that are necessary to physically and electrically interconnect the Generating Facility to the Transmission Provider's Transmission System. Interconnection Facilities are sole use facilities and shall not include Distribution Upgrades, Stand Alone Network Upgrades or Network Upgrades.
  - **Interconnection Customer's Interconnection Facilities** shall mean all facilities and equipment, as identified in Appendix A of the Standard Large Generator Interconnection Agreement, that are located between the Generating Facility and the Point of Change of Ownership, including any modification, addition, or upgrades to such facilities and equipment necessary to physically and electrically interconnect the Generating Facility to the Transmission Provider's Transmission System. Interconnection Customer's Interconnection Facilities are sole use facilities.
  - **Transmission Provider's Interconnection Facilities** shall mean all facilities and equipment owned, controlled, or operated by the Transmission Provider from the Point of Change of Ownership to the Point of Interconnection as identified in Appendix A to the Standard Large Generator Interconnection Agreement, including any modifications, additions or upgrades to such facilities and equipment. Transmission Provider's Interconnection Facilities are sole use facilities and shall not include Distribution Upgrades, Stand Alone Network Upgrades or Network Upgrades.

## FERC Definitions, Continued

- **Current terms defined per the LGIP/LGIA:**
  - **Network Upgrades** shall mean the additions, modifications, and upgrades to the Transmission Provider's Transmission System required at or beyond the point at which the Interconnection Facilities connect to the Transmission Provider's Transmission System to accommodate the interconnection of the Large Generating Facility to the Transmission Provider's Transmission System.
    - **Stand Alone Network Upgrades** shall mean Network Upgrades that are not part of an Affected System that an Interconnection Customer may construct without affecting day-to-day operations of the Transmission System during their construction. Both the Transmission Provider and the Interconnection Customer must agree as to what constitutes Stand Alone Network Upgrades and identify them in Appendix A to the Standard Large Generator Interconnection Agreement. If the Transmission Provider and Interconnection Customer disagree about whether a particular Network Upgrade is a Stand Alone Network Upgrade, the Transmission Provider must provide the Interconnection Customer a written technical explanation outlining why the Transmission Provider does not consider the Network Upgrade to be a Stand Alone Network Upgrade within 15 days of its determination.
  - **Distribution Upgrades** shall mean the additions, modifications, and upgrades to the Transmission Provider's Distribution System at or beyond the Point of Interconnection to facilitate interconnection of the Generating Facility and render the transmission service necessary to effect Interconnection Customer's wholesale sale of electricity in interstate commerce. Distribution Upgrades do not include Interconnection Facilities.

# Duke Energy Generator Interconnection

Queue Reform Stakeholder Meeting #4

September 27, 2019



# SAFETY

# Goals and Agenda for the Meeting

## Goals

- Update on activities and timeline
- Discuss reforms based on feedback
- Discuss transition mechanisms
- Deep dive on processes
- Feedback session

## Agenda

Topic	Time
1. Welcome, Safety & Logistics	9:00 – 9:10
2. Review Stakeholder Process, Ground Rules and Principles	9:10 – 9:30
3. Stakeholder feedback and Upcoming Filing	9:30 – 10:00
BREAK	10:00 – 10:15
4. Revised Queue Reform Plan <ul style="list-style-type: none"><li>• Transition Plan &amp; Eligibility</li><li>• Enrollment, Timeline, and Milestones</li><li>• Exemption</li><li>• Process Transparency</li><li>• Cost Allocations</li></ul>	10:15 – 11:45
LUNCH	11:45 – 12:45
5. Discussion and Feedback	12:45 – 2:15
BREAK	2:15 – 2:30
6. Wrap-up and Next Steps	2:30 – 3:00



# Ground Rules

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# Guiding Principles

- Effective processing of interconnection requests is fundamental to facilitating development of additional renewable resources
- Stakeholder input provides valuable insight to guide queue reform process development
- Other regions undergoing queue reform provides valuable insights and lessons learned
- Proposed changes must conform with applicable law and regulations
- Proposed process changes must be developed and administered in a fair, objective, and expeditious manner

# Charter

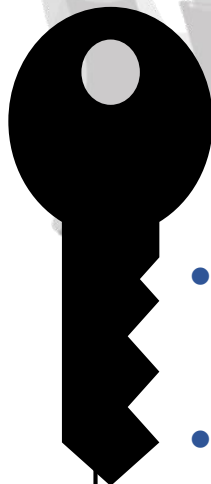
- The Interconnection Reform Stakeholder Process will examine existing queue processes and suggest modifications for improving efficiency and effectiveness, including the development of a proposal for a grouping study process.
- Duke Energy and stakeholders will consider industry best practices and any specific regional requirements in developing proposed changes that position the Companies to facilitate achievement of future renewable energy policy objectives.

# Stakeholder Meeting 1 Summary and Key Takeaways

## Stakeholder Meeting 1

March 28, 2019 in Raleigh, NC

- Provided stakeholders an overview of the current state of the queue and the drivers behind the queue process improvement initiative;
- Presented and discussed potential options for queue process improvement, such as, Locational Grouping, Temporal Grouping and a combination of Temporal and Locational Grouping;
- Presented a high level analysis of other utilities and RTOs implementation approach to cluster studies;
- Provided a timeline and plan for the stakeholder engagement process.



## Key Takeaways

- Duke Energy launched the process for queue reform.
- Stakeholder engagement process was discussed. Stakeholders were encouraged to provide comments.
- Queue Reform website was set up.
- Duke shared preliminary timeline and expectations with stakeholders and solicited feedback.

# Stakeholder Meeting 2 Summary and Key Takeaways

## Stakeholder Meeting 2

April 25, 2019 in Raleigh, NC

The following topics were presented:

- Overview and analysis of the current DEC and DEP interconnection queue for FERC and State solar projects;
- Overview of the benefits of queue reform and overview of evolving interconnection process;
- Detailed nationwide process benchmarking for several utilities and RTOs. Benchmark included Public Service of New Mexico, Xcel Energy, MISO, SPP and CAISO;
- A detailed queue reform framework for Duke Energy, including the process flow diagrams, timeline and milestone, and a high level cost allocation methodology.





## Key Takeaways

- 139 comments were gathered from the stakeholders.
- Top five feedback topics:
  - Study Assumptions and Methodology (21%)
  - Overall Queue Reform (19%)
  - Cost Allocation (17%)
  - Clustering Process (16%)
  - Timeline (10%)
- Comments and questions were addressed in [SM#2 Frequently Asked Questions](#)

# Stakeholder Meeting 3 Summary and Key Takeaways

Stakeholder Meeting 3
June 18, 2019 in Columbia, SC
<p>The following topics were presented:</p> <ul style="list-style-type: none"> <li>Recap of Stakeholder Meeting 2 and stakeholder comment summary.</li> <li>Presentation of the Stakeholder Meeting 2 FAQ and answers to some of the frequently asked questions;</li> <li>Additional benchmarking of interconnection process per stakeholders' request, including ERCOT and PJM;</li> <li>Presentation on cluster study exemption guideline, more details on milestone and refund, cost allocation;</li> <li>Detailed presentation on serial to cluster transition plan.</li> </ul>





## Key Takeaways

- 128 comments were gathered from the stakeholders.
- Top five feedback topics:
  - Transparency (14%)
  - Overall Queue Reform (12%)
  - Timeline (10%)
  - Transition Plan (10%)
  - Study Methodology (9%)
- Comments and questions were addressed in [SM#3 Frequently Asked Questions](#)

# RECAP AND UPCOMING FILING

# Interconnection Queue Reform Objectives

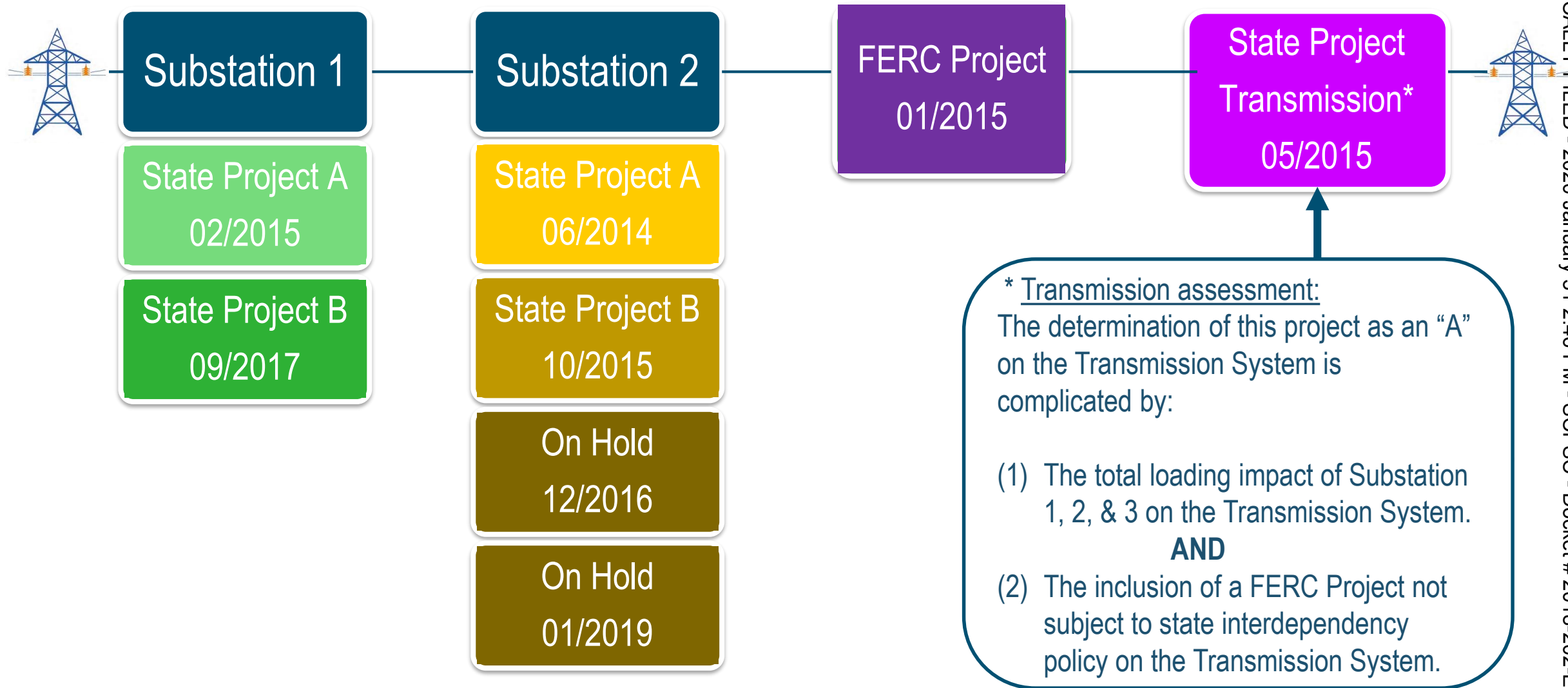
- Increase efficiency of interconnection process and reduce size of interconnection queue
- Meet North Carolina (NC) commitment to pursue queue reform and propose workable framework
- Explore a common interconnection planning study approach for FERC jurisdictional and State jurisdictional projects
- Align the rules and workflows by which both transmission and distribution level projects are assessed
- Develop an improved interconnection process by removing bottlenecks that cause queue backlogs
- Continue to ensure reliable and safe transmission and distribution systems that comply with NAESB, FERC, NERC, NESC, NEC, NC, SC, and FL standards

# Current State: A Case for Queue Reform

<b>Growing Queue</b>	The increasing size of the interconnection queue is creating challenges for both Duke Energy and developers that are not readily solvable under the existing processes
<b>Increasing Interdependencies</b>	Solar penetration levels are increasingly resulting in interdependencies between transmission and distribution requests as well as FERC and State projects.
<b>Network Upgrades Increasingly Triggered</b>	Due to the level of successful interconnections achieved to date, interconnection requests are becoming increasingly likely to trigger substantial network upgrades.
<b>Cost Sharing Mechanism</b>	The existing serial process prevents developers from sharing costs when large upgrades are required creating both market and system congestion
<b>Growing Interest in Cluster Studies</b>	Support is growing amongst utilities and FERC to move to a “first ready/first served” policy in managing the SGIP and LGIP queue process



# Current State: Interconnection Queue Interdependency Example



# Proposed Future State: T&D Cluster Study Benefits

## Process Improvement

- Process all interconnection requests simultaneously included in one cluster on a concurrent basis
- Efficiently identify, coordinate, and process projects that do not adversely impact the Duke T&D systems

## T&D Alignment

- Evaluate the impacts of Distribution connected projects on distribution facilities, providing more streamlined coordination of distribution upgrades
- Develop an improved process for assessing the impacts of Transmission and Distribution connected projects on transmission facilities and provide more efficient coordination of transmission upgrades

## Equitable Cost Allocation

- Equitably assign costs to projects (transmission and distribution) in the cluster study based on the relative impact of a project on a given facility that requires an upgrade

# Tentative Queue Reform Implementation Timeline

October 2019\*- File NCUC Queue Reform Proposal

April 2020\* - File NCIP & SCGIP revisions for Transition Cluster

September 2020\* - NCIP & SCGIP Approvals

Q4 2020\* - Begin Transition Period

Q4 2020\* - Begin drafting FERC OATT revisions

2021\* - File FERC OATT, NCIP, & SCGIP revisions for full cluster study

2021\* - FERC and State Approvals

\*Tentative

# October 2019 NCUC Proposal Filing Summary

- Overview of Queue Issues
- Overview of Grouping Studies
- Duke Proposed Framework Description
- Stakeholder Process Summary
- Survey Results
- Conclusions
  - Constructive work has occurred (Consensus Issue Areas)
  - More work to do (Non-Consensus Issue Areas)
  - Jurisdictional Alignment (NC/SC/FERC)
  - Timeline

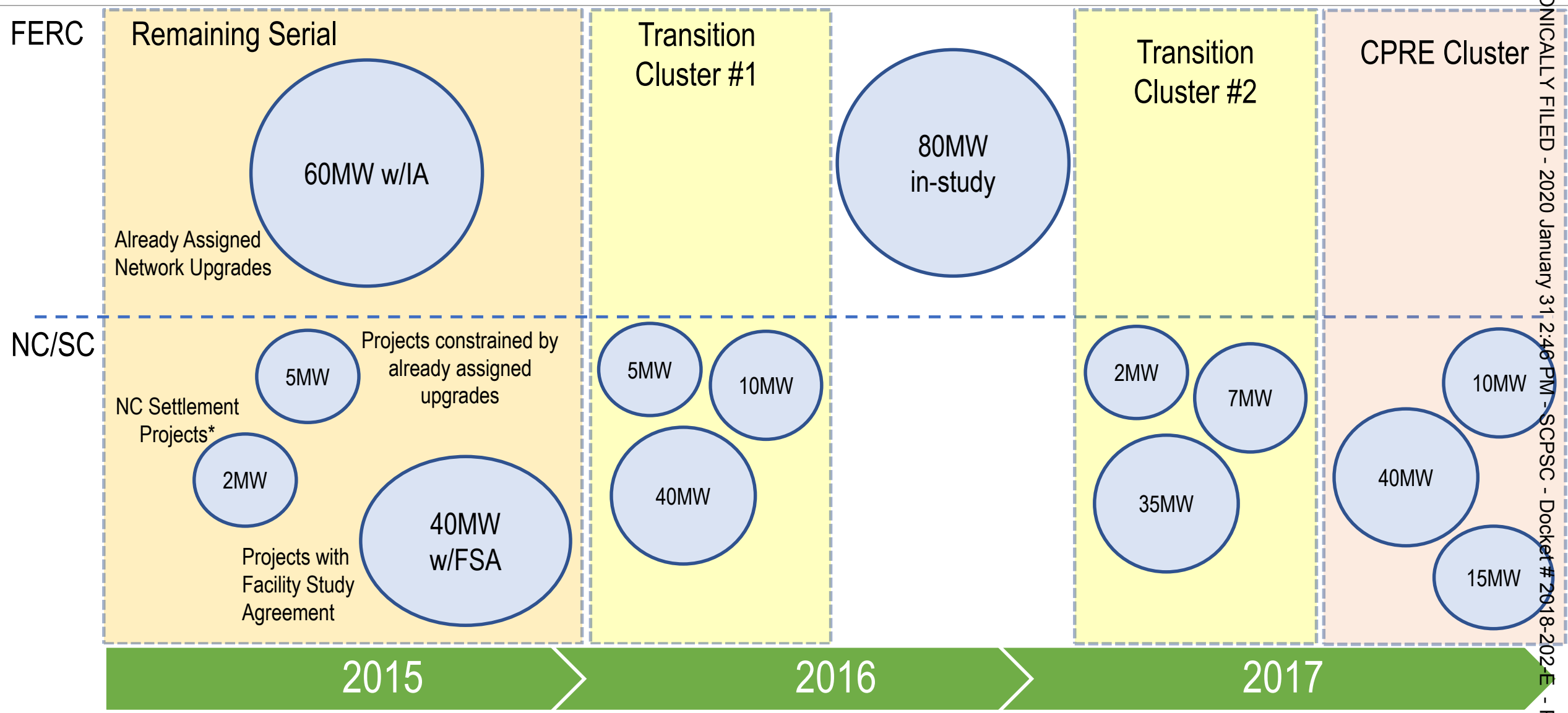
# Feedback Driven Proposals

- **Transition Plan**
- **Cluster Study Enrollment Windows\***
- **Cluster Study Phases and Milestones**
  - Reduced overall duration of study process
  - Increased Cluster Study frequency
  - Revised milestone payment amounts consistent with benchmarking (PSCo, SPP, MISO)
  - Shifted majority of Upgrade payments to post-IA
  - Increased study deposit to mitigate restudy impacts
- **Exemption**
  - Simplified, improved process for small PP / NEM customers
- **Cost Allocation**
- **Process Transparency\***
  - Base Case Models
  - Pre-study information
  - Locational Guidance
  - Study Report Details
  - Business Practice Manuals

\*New proposal items

# Serial to Cluster Transition Plan

# Serial-to-Cluster Transition Period



# Serial to Cluster Transition Eligibility

Project status (effective date)	Next step / options
SIS Completed	Remain serial
Settlement Projects	Remain serial
Interim SIS	Remain serial
CPRE Projects	Remain in CPRE grouping subordinate to earlier clusters and projects remaining serial
FERC Projects	Remain serial, pending OATT revision
Projects On Hold	Transition cluster
Projects In-Study	Transition cluster



# Serial to Cluster Transition - FAQ

***Q: When does the transition period start?***

A: The transition period will start 45 days after the last required state IP revision approval. Studies queued before that date will be considered transition projects. Studies queued after that date will be part of the first definitive cluster.

***Q: When does the transition period end?***

A: The transitional period ends when all the transition projects have received an IA or have withdrawn.

***Q: How many transition clusters will there be?***

A: This will depend on the progress of currently queued projects, as well as the number and jurisdiction of requests received between now and the beginning of the transition period.

***Q: Will transition projects be subject to proposed deposits and timelines?***

A: No, transition project deposits and timelines will be consistent with existing the study process.

***Q: What happens to FERC projects in the transition period?***

A: FERC projects will be considered serially, unless joint OATT revisions are approved during the transition period that allow for FERC transition projects to be clustered.

# Serial to Cluster Transition - FAQ

***Q: Can FERC projects elect to switch to the cluster process?***

A: FERC projects that seek to enter the state queue should do so before the beginning of the transition period. FERC projects wishing to move into the state queue after the beginning of the transition period will be part of the first definitive cluster study.

***Q: What happens to the upgrades costs of projects that are left serial if they withdraw after transition clusters are completed and IA signed?***

A: Clustered projects requiring upgrades assigned to prior-queued projects will not execute IAs until payment has been made by the prior queued project. The withdrawal of a prior-queued serial project with upgrades assigned would trigger re-study in the same way another project in the same cluster might.

***Q: How soon can projects interdependent to remaining serial projects be constructed and connected?***

A: Clustered projects requiring upgrades assigned to prior-queued projects will not execute IA's until full payment has been made by the prior queued project.

***Q: Have you considered ways to allow interdependent projects to connect before the network upgrades associated with serial projects are completed?***

A: No, while this is a critical question for stakeholders, any solution is likely outside the scope of the current queue reform effort.

# Serial to Cluster Transition - FAQ

***Q: Will transition clusters have priority over CPRE clusters?***

A: No, a CPRE queue date will bisect transition clusters.

***Q: Can settlement projects elect to join the transition cluster?***

A: At this time, our intention is for Settlement projects to remain serial and unaffected by the proposed cluster study process.

***Q: Will distribution upgrades and transmission upgrades be clustered separately during the transition period?***

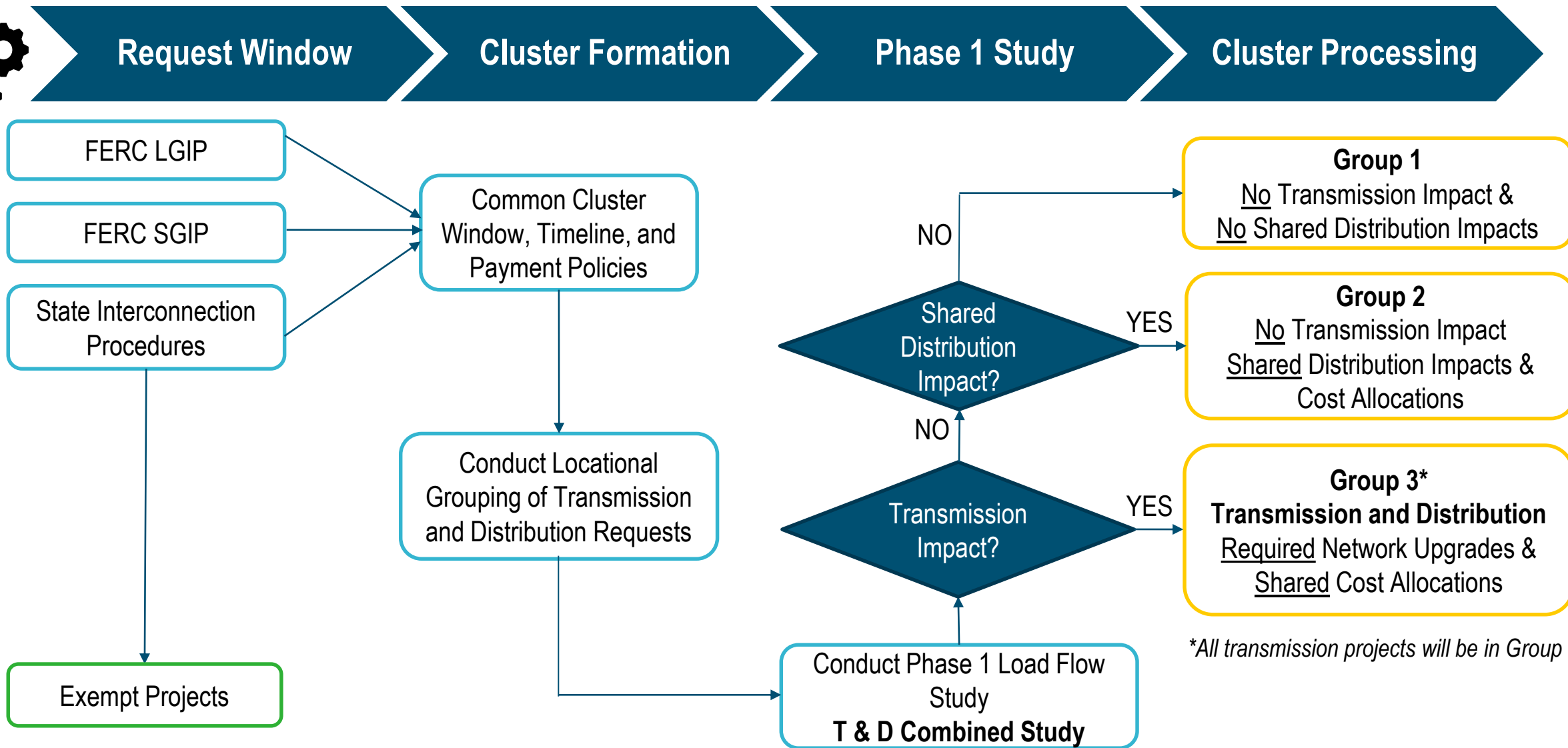
No, while there will certainly be projects on the same feeder that are being processed in different clusters, it is less complex and arguably more equitable to avoid this complication.

# Enrollment, Timeline, and Milestones

# Cluster Study Enrollment

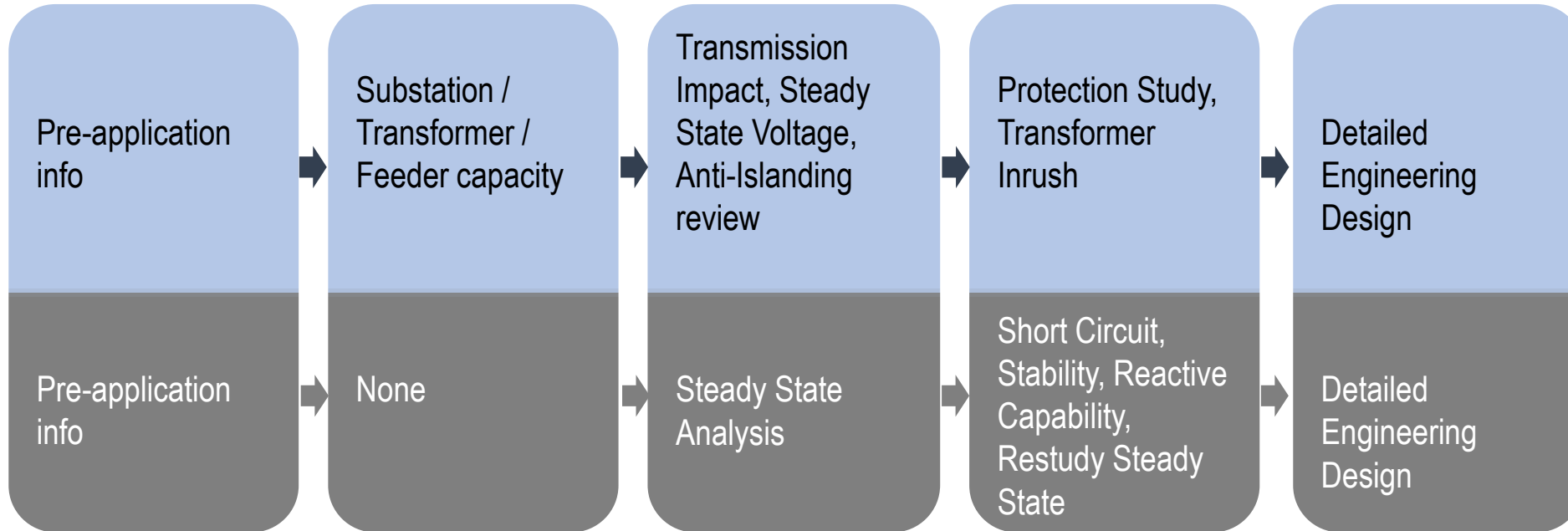
- Projects not eligible for Cluster Study Exemption or Fast Track process will be required to enroll during a designated Cluster Study open enrollment window.
- The enrollment window for each cluster study will be open for no less than 180 calendar days.
- There will be at least one cluster study enrollment per calendar year in each jurisdiction.
- Enrollment in the final 30 calendar days (CD) of the window will result in higher fees (TBD).
- Upon closing of enrollment, 30 CD will be provided for IR document verification and correction.

# Proposed Cluster Impact Group Determination



\*All transmission projects will be in Group 3

# Studies Conducted



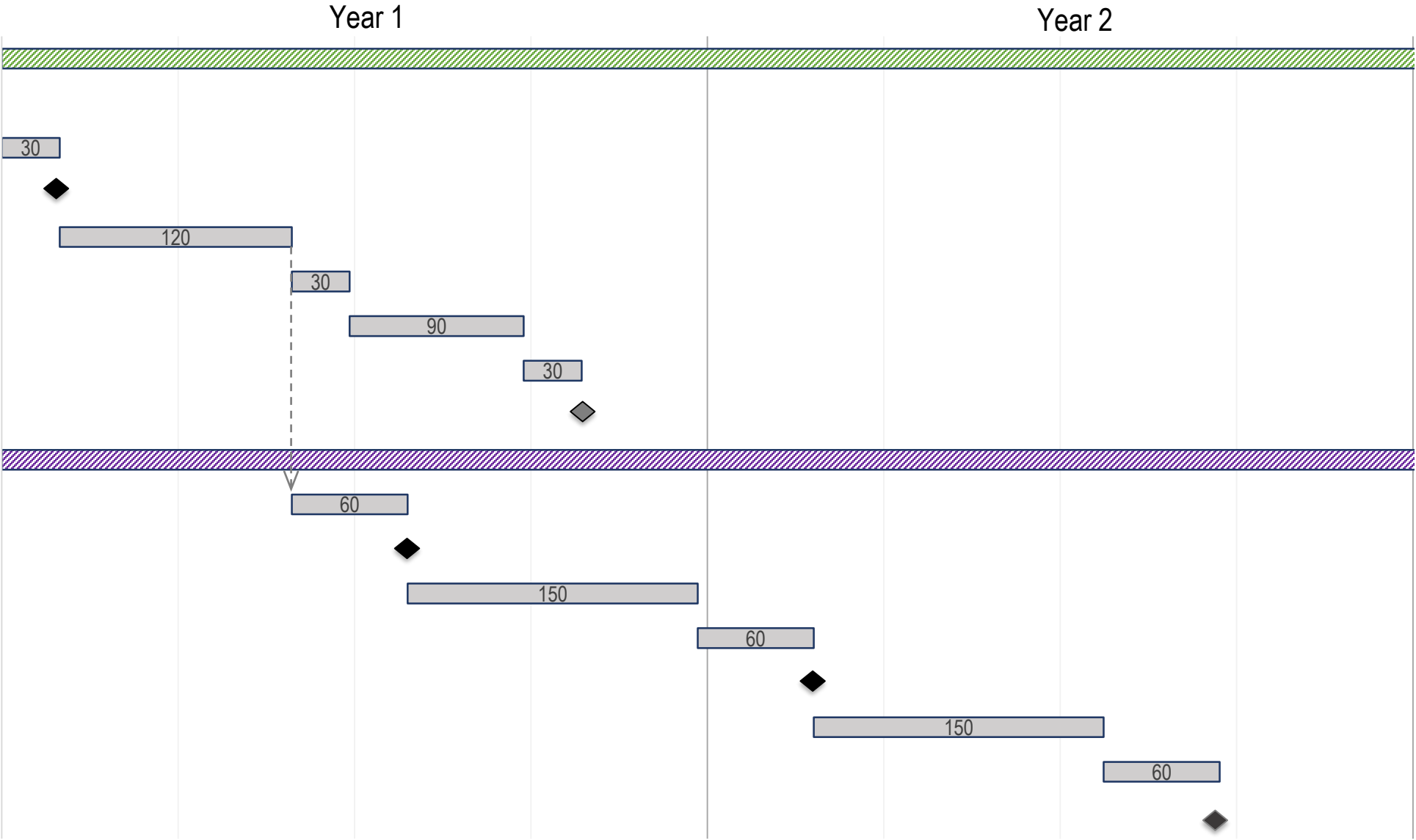
Distribution (D) SIS Screen/Study

Transmission (T) SIS Screen/Study

# Cluster Study Process Timeline- Cluster 1 (revised)

Expedited (Group 1 & 2)

Full Study (Group 3)

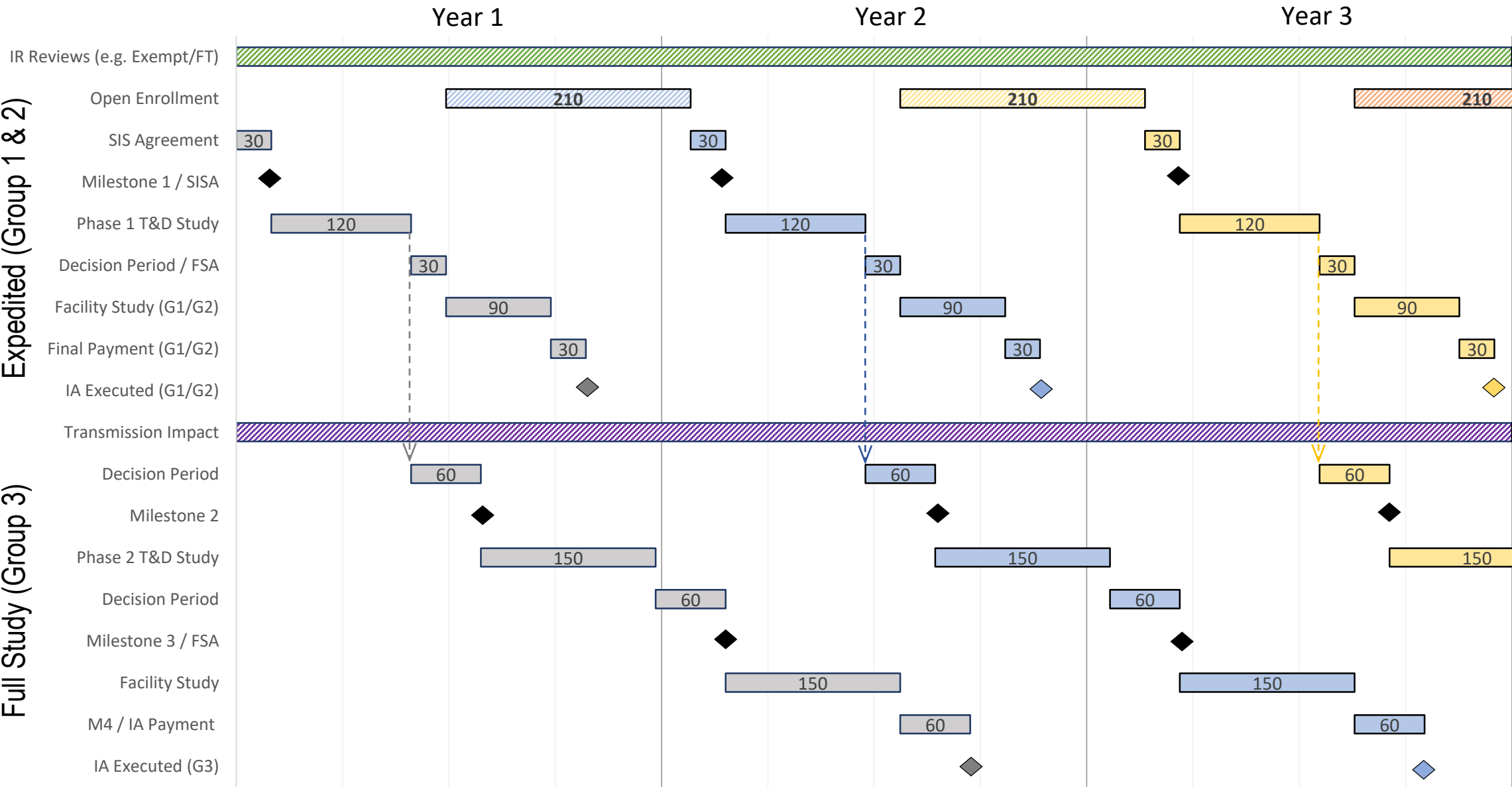




# Cluster Study Process Timeline (revised)

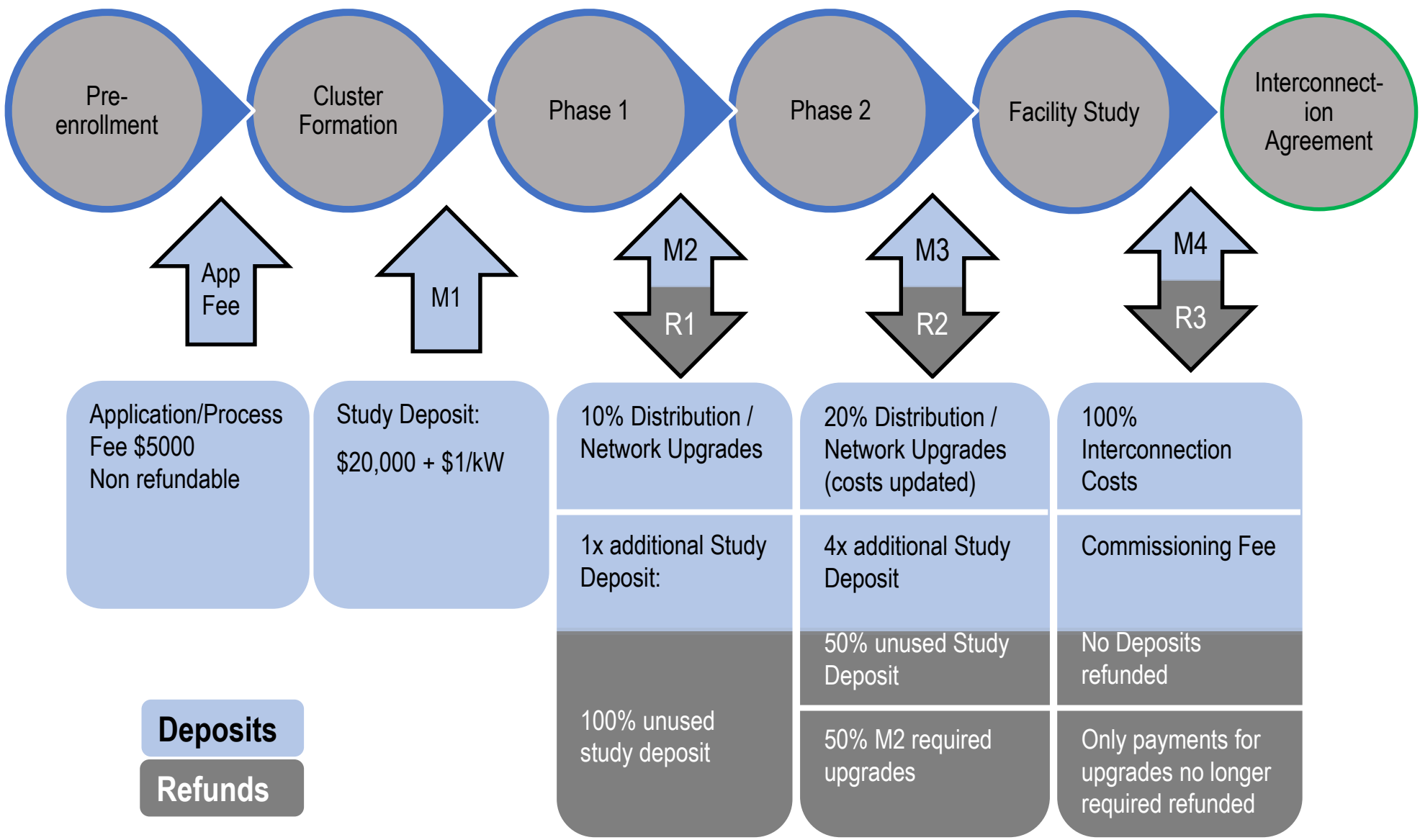
Expedited (Group 1 & 2)

Full Study (Group 3)



- Legend
- Cluster 1 (Grey)
  - Cluster 2 (Blue)
  - Cluster 3 (Yellow)
  - Cluster 4 (Red)

# Milestones and Refunds (revised)



- Benchmarking:
- PSCo
  - MISO
  - SPP

**Deposits**

**Refunds**

# Cluster Study Milestone Payment and Refund Benchmarking

IOU/ISO	M1	M2	M3	M4	M5
Duke SH4 Proposal	Study Deposit: \$20k+\$1/kW	10% NU + 1x Study Deposit	20% NU + 4x Study Deposit	100% Interconnection Facilities	N/A, IA at M4
"Hybrid approach"	None	100% Study Deposit*	50% NU pmts (M2) + 50% Study Deposit	NU payments not required will be refunded	N/A, IA at M4
Duke SH3 Proposal	Study Deposit \$20k+\$1/kW	30% NU	60% NU	100% NU	100% Interconnection Facilities
"Upgrade-based"	None	100% Study Deposit*	50% NU payments + 100% Study Deposit*	25% NU payments + 100% Study Deposit*	10% NU payments + 100% Study Deposit*
SPP	\$2000/MW	\$2000/MW <> 10% CF**	20% NU	FS / IA	N/A, IA at M4
"Upgrade-based"	None	Full refund of M1	No refund unless costs change >25% / \$10k/MW	No refund unless costs change >35% / \$15k/MW	N/A, IA at M4
MISO	\$5k + Study Deposit	\$4000/MW	10% NU	20% NU	FS / IA
"Upgrade-based"	None	100% Study Deposit*	100% NU pmts (M2)	100% NU pmts (M3)	No refund
PSCo (proposed) (similar to PNM)	Study Deposit: \$75k/\$150k/\$250k	2x additional Study Deposit	4x additional Study Deposit	6x additional Study Deposit	10x total Study Deposit
"Deposit/Penalty-based"	None	100% Study Deposit*	No refund of deposits	No refund of deposits	No refund of deposits

## Legend

Milestone payment to proceed

Refund if withdrawn at/before milestone

NU = Network Upgrades

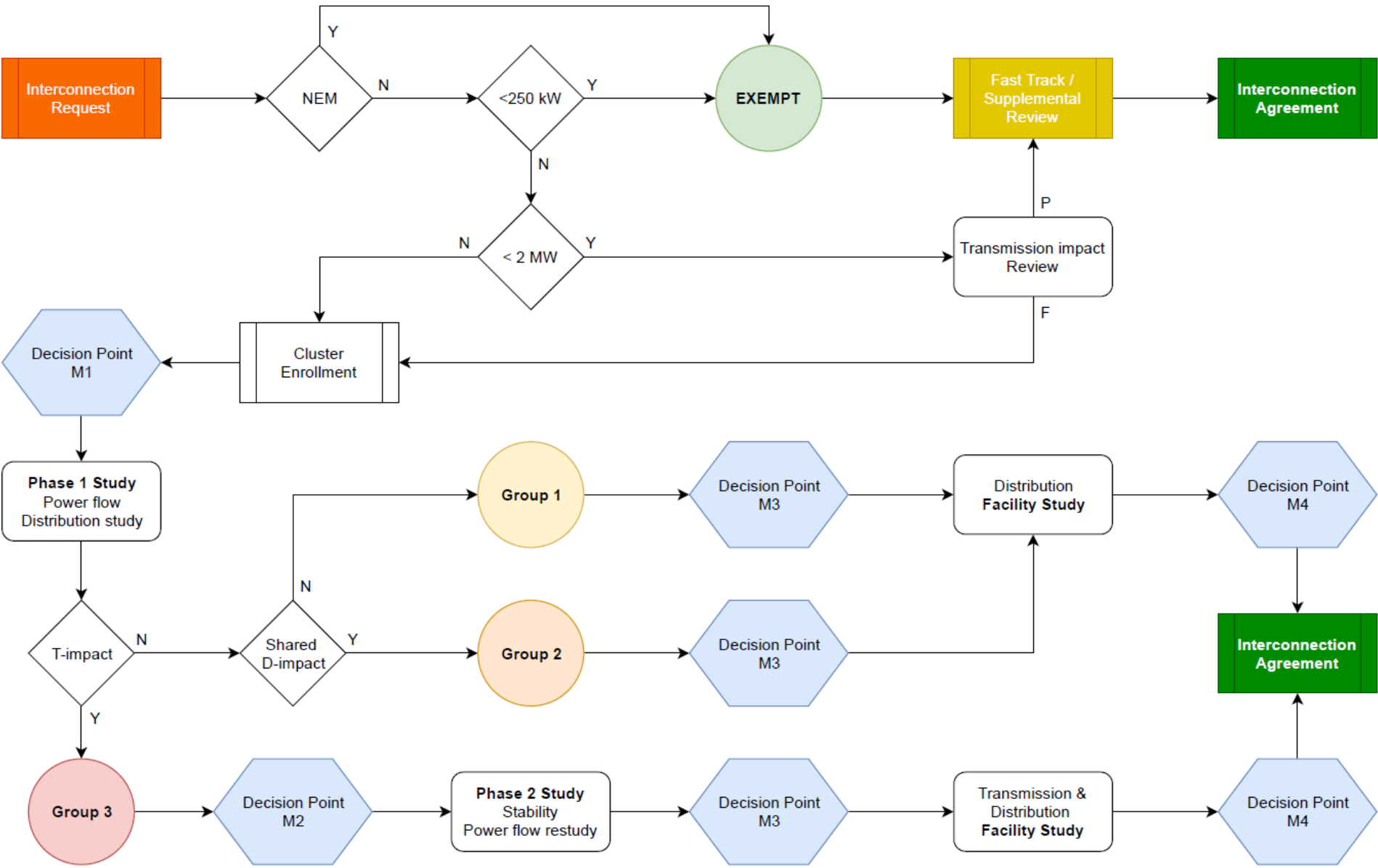
\*Only unused portion of study deposit amount shown is refunded

\*\*CF=Cost Factor used by SPP; derivative value of NU

# Cluster Study Exemption Guidelines (revised)

- Projects exempt from Cluster Study process will be reviewed and processed on serial basis.
- IR reviews will be ongoing parallel to the Cluster Study process screening for:
  - Exempt projects
  - Fast Track projects
- Exemption Criteria:
  - < 30 kW (e.g. NCIP Section 2)
  - NEM: all projects
  - Power Purchase: < 250 kW
- Projects not exempt but < 2000 kW are eligible for Fast Track Process
  - FT/SR eligible projects will be reviewed for Transmission impact.
  - Upon determination of Transmission impact, Cluster enrollment is required to proceed.
- No disadvantage to projects which currently benefit from FT / SR process (e.g. NCIP Section 3)

# Cluster Process Guide



Serial Process



Expedited  
Grouping Studies



Full Cluster Studies

# Transparency

# Data Transparency in Cluster Study SISR

- Description of base feeder models / topology
- Substation and feeder planning limits
- Screenshots of feeder/bank maps with relevant LVR locations highlighted
- Voltage limits and planning criteria
- Criteria for Anti-Islanding
- General assumptions for power flow analysis
- Lists of model assumptions for System Impact Study:
  - Source equivalent model (voltage, impedance, demand)
  - The distribution circuit's existing line voltage regulator(s)
  - Voltage regulator and Load Tap Changer setting inputs and basis
  - Existing Generating Facilities interconnected to the distribution circuit

# Existing SISR Format

## Table of Contents

Preface.....	3
Interconnection Data.....	4
Circuit Information.....	5
Figure 1 - Point Of Interconnection.....	6
Distributed Energy Resource Planning & Interconnection Guidelines.....	7
Transformer Inrush Study.....	8
Circuit Breaker Short Circuit Capability Limits.....	9
Table 1 – High Fault Area Violations.....	9
Thermal Overload Or Voltage Limit Violations.....	10
Table 2 - Voltage Limit Results – Peak Circuit Loading with Existing Infrastructure.....	10
Table 3 - Voltage Limit Results – Valley Circuit Loading with Existing Infrastructure.....	10
Table 4 - Voltage Limit Results – Peak Circuit Loading Incorporating Remediation.....	11
Table 5 - Voltage Limit Results – Valley Circuit Loading Incorporating Remediation.....	11
Grounding Requirements And Electric System Protection.....	12
Results.....	13
Table 6 - One-Time System Upgrades estimate.....	14
Appendix.....	15

# New SISR Format



## Table of Contents

Executive Summary.....	5
1. Introduction.....	6
2.1 DER Facility.....	6
2.2 Interconnection Substation and Circuits.....	6
2. Description of Base Study Model.....	8
2.1 Pre-Project Feeder Level Base Model.....	8
2.2 Pre-Project Bank Level Base Model.....	8
3 Power Flow Analysis.....	9
3.1 Pre-Project Analysis.....	9
3.2 Post-Project Analysis.....	9
3.2.1 Peak Demand Analysis.....	10
3.2.2 Valley Demand Analysis.....	10
3.2.3 Reverse Power Flow at Substation.....	11
3.3 Post-Project with Proposed Mitigation.....	11
3.3.1 Peak Demand Analysis.....	11
3.3.2 Valley Demand Analysis.....	12
3.3.3 Reverse Power Flow at Substation.....	12
4 Short Circuit Analysis.....	14
5 Transformer Inrush Analysis.....	15
6 Grounding Requirements and Electric System Protection Study.....	16
7 Study Conclusions and Preliminary Cost Estimates.....	17
8 References.....	18
9 Appendix.....	19
Appendix A. Transmission System Impact Investigation and Cost Estimation.....	19



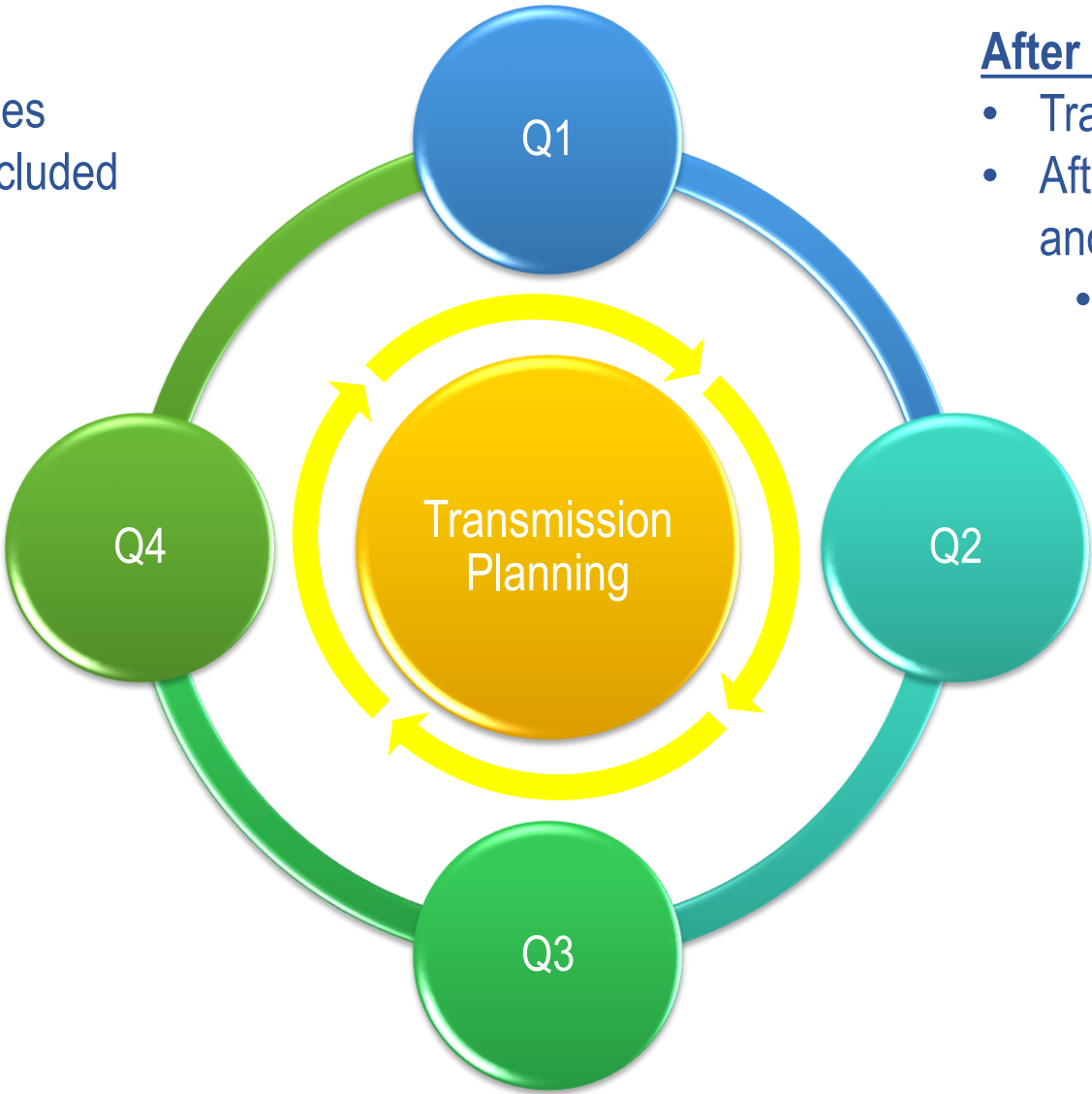
# Other Guidance and Information Provision

- Posted to site for Interconnection Customers:
  - Business Practice Manuals and Standards
  - LVR location guidance
  - Substation available capacity
- Provided during Pre-enrollment / Enrollment:
  - Pre-application info (e.g. per NCIP Section 1.3.2)
    - General circuit info
    - Circuit limitations / voltage regulators
    - Known Transmission constraints

# Process Transparency: Transmission Models

## Before Queue Reform

- Transmission Planning base cases
  - Hypothetical projects not included
  - Summer
    - Near-term
    - Long-term
  - Winter
    - Near-term
    - Long-term



## After Queue Reform

- Transmission Planning base cases
- After completion of study, Phase 1 and 2 cases available upon request
  - Includes cluster projects

\*Quarterly postings reflect the models as of that date

# Process Transparency – Transmission SIS cluster reports

Proposed structure (MISO example)

Contents	
<b>1. Executive Summary</b>	<b>5</b>
1.1. Project List	5
1.2. Total Network Upgrades	6
<b>2. FERC Order 827 Compliance Review</b>	<b>8</b>
<b>3. Model Development and Study Assumptions</b>	<b>8</b>
3.1. Base Case Models	8
3.2. Monitored Elements	8
3.3. Contingencies	9
3.4. Study Methodology	9
3.5. Performance Criteria	9
<b>4. Thermal Analysis</b>	<b>10</b>
4.1. J934	10
<b>5. Voltage Analysis</b>	<b>10</b>
<b>6. Stability Analysis</b>	<b>10</b>
6.1. Model Development	10
6.2. Study Methodology	10
6.3. Study Criteria	11
6.4. Study Results	11
<b>7. Short Circuit Analysis</b>	<b>12</b>
<b>8. Affected System Impact Study</b>	<b>12</b>
8.1. J639	12
8.2. J663	12
8.3. J697	12
8.4. J830	12
8.5. J834	12
8.6. J866	12
8.7. J868	12
8.8. J888	12
8.9. J893	12
8.10. J907	13
8.11. J908	13
8.12. J909	13
8.13. J919	13
8.14. J934	13
8.15. J944	13
<b>9. Deliverability Analysis</b>	<b>13</b>
9.1. Introduction	13
9.2. Determining the MW Restriction	13
9.3. Deliverability Study Results	14
9.3.1. J639	14
9.3.2. J663	14
9.3.3. J830	14
9.3.4. J834	15
9.3.5. J866	15
9.3.6. J868	15
9.3.7. J888	16
9.3.8. J893	16
9.3.9. J907	16
9.3.10. J908	16
9.3.11. J909	16
9.3.12. J919	17
9.3.13. J934	17
9.3.14. J944	17
<b>10. Shared Network Upgrades Analysis</b>	<b>17</b>
<b>11. Cost Allocation</b>	<b>17</b>
11.1. Cost Assumptions for Network Upgrades	17
11.3. Cost Allocation Methodology	18
<b>Appendix A – MISO ERS Analysis (CEI)</b>	<b>19</b>
<b>Appendix B – MISO Stability Analysis (CEI)</b>	<b>19</b>
<b>Appendix C – Entergy Local Planning Criteria Stability Analysis (CEI)</b>	<b>19</b>
<b>Appendix D – Short Circuit Study Reports (CEI)</b>	<b>19</b>
<b>Appendix E – AEG Affected Systems Study Report (CEI)</b>	<b>19</b>
<b>Appendix F – SPP Affected Systems Study Report (CEI)</b>	<b>19</b>
<b>Appendix G – TVA Affected Systems Study Report (CEI)</b>	<b>19</b>
<b>Appendix H – MISO Deliverability Analysis (CEI)</b>	<b>19</b>

## Final MISO DPP 2017 August South Area Study Phase III Report

May 9<sup>th</sup>, 2019

### 9.3.2. J663

This generator is determined to be deliverable for 94.67 MW. Required upgrades to attain higher deliverable levels were identified in the NRIS analysis. Table 5 shows the NRIS results and cost estimates determined in the NRIS analysis.

Table 5: NRIS Results for J663

J663 Deliverable (NRIS) Amount in 2022 Case: (Conditional on ERS and case assumptions)				94.67 MW (94.67%)			
Next Upgrade for Higher NRIS Level (cumulative) (L.e. All upgrades must be mad for 100% NRIS)	Level of Service Attainable (MW)	Distribution Factor	Constraint in ERS Analysis?	Projects Associated with ERS Constraint	Projects Associated with NRIS Constraint	NRIS Cost Allocated to Project	Total Cost of Upgrade (\$)
Batesville – Batesville TVA 161 kV #1	94.67	11.45%	No		J663, J834, J866, J907	17%	480,000
Batesville – Batesville TVA 161 kV #2	100	11.45%	No		J663, J834, J866, J907	17%	480,000

# Cost Allocation

# Cost Allocation- Transmission Upgrades

- Identify constrained facility (thermal) and worst condition
- Determine impact of projects on constrained facilities based on worst condition
  - Calculate Distribution Factor **[MW Impact / Generator MW Rating]**
  - Calculate Loading Impact **[MW Impact / Applicable Facility Rating]**
  - Calculate MW Impact **[Distribution Factor x Generator Rating (MW)]**
- Projects with Distribution Factor < 3% and Loading Impact < 1% on constrained facilities are exempt from cost allocation
- Cost for the required thermal upgrades will be allocated based on the MW Impact / Total MW Impact for projects subject to cost allocation.

# Network Upgrade Cost Allocation - Example

Upgrade Cost = \$50 MM

Rating of the line = 200 MVA

	A	B	C	D	E	F	G	H	Total
Generator Rating (MW)	100	200	50	400	750	20	5	1	-
Distribution Factor (%) <small>Exemption Criteria: &lt; 3%</small>	4	3	2	2.5	2.67	1	20	50	-
Loading Impact (%) <small>Exemption Criteria: &lt; 1%</small>	2	3	0.5	5	10	0.1	0.5	0.25	-
MW Impact	4	6	1	10	20	0.2	1	0.5	42.7 MW
<b>MW Impact for Cost Allocation</b>	<b>4</b>	<b>6</b>	<b>Exempt</b>	<b>10</b>	<b>20</b>	<b>Exempt</b>	<b>1</b>	<b>0.5</b>	<b>40.7 MW</b>
Cost Allocation (%) = MW Impact / Total MW Impact	9.64%	14.46%	-	24.10%	48.19%	-	2.41%	1.20%	100%
Cost Allocation (\$ MM) = Cost Allocation (%) × Upgrade Cost	\$4.82 MM	\$7.23 MM	-	\$12.05 MM	\$24.10 MM	-	\$1.20 MM	\$0.60 MM	\$50 MM

# BREAKOUT SESSION

# Pre-Stakeholder Meeting Survey Results

- Pre-meeting survey was shared with stakeholders on Sept 20<sup>th</sup>
- Results based on 35 responses

	1	2	3	4	5	6	7	8	9	10	11	Sum of 1-3	Sum of 1-4
Cluster Timeline/Predictability	11.43%	20.00%	25.71%	11.43%	5.71%	0.00%	0.00%	5.71%	2.86%	14.29%	2.86%	57.14%	68.57%
Equitable Cost Allocation	5.71%	40.00%	8.57%	14.29%	11.43%	11.43%	8.57%	0.00%	0.00%	0.00%	0.00%	54.28%	68.57%
Resolving Interdependencies	31.43%	8.57%	5.71%	2.86%	11.43%	14.29%	11.43%	11.43%	0.00%	2.86%	0.00%	45.71%	48.57%
Transparency	20.00%	8.57%	5.71%	8.57%	8.57%	14.29%	22.86%	5.71%	0.00%	0.00%	5.71%	34.28%	42.85%
Distribution Violation Solutions	2.86%	17.14%	5.71%	2.86%	0.00%	2.86%	22.86%	5.71%	2.86%	28.57%	8.57%	25.71%	28.57%
Affected Systems Coordination and Communication	2.86%	2.86%	17.14%	5.71%	5.71%	2.86%	11.43%	31.43%	8.57%	8.57%	2.86%	22.86%	28.57%
Preservation of Nameplate Settlement Terms	5.71%	2.86%	11.43%	0.00%	0.00%	8.57%	0.00%	5.71%	20.00%	14.29%	31.43%	20.00%	20.00%
Transition/ Cluster Eligibility	11.43%	0.00%	8.57%	5.71%	5.71%	22.86%	5.71%	17.14%	8.57%	2.86%	11.43%	20.00%	25.71%
Near-future Development Opportunities	5.71%	0.00%	5.71%	14.29%	25.71%	8.57%	5.71%	2.86%	5.71%	8.57%	17.14%	11.42%	25.71%
Cluster Milestone Payments and Refunds	2.86%	0.00%	2.86%	22.86%	17.14%	5.71%	8.57%	14.29%	11.43%	5.71%	8.57%	5.72%	28.58%
Provisional Service	0.00%	0.00%	2.86%	11.43%	8.57%	8.57%	2.86%	0.00%	40.00%	14.29%	11.43%	2.86%	14.29%



# Breakout Session Guidance

- Purpose: To capture feedback that will assist Duke's ongoing efforts in building a future state framework benefitting stakeholders
- Feedback on the following topics will be captured in today's session:
  - Cluster Timeline/Predictability
  - Equitable Cost Allocation
  - Resolving Interdependencies
  - Transparency

# Stakeholder Feedback on Today's Presentation

- Purpose: To capture feedback that will assist Duke's ongoing efforts in building a future state framework benefitting stakeholders
- Feedback on the following topics will be captured via Stakeholder Feedback Forms sent to [queuereform@duke-energy.com](mailto:queuereform@duke-energy.com) on or before October 4, 2019:
  - Transition Plan
  - Revised Cluster Proposal
  - Distribution Transparency
  - Transmission Transparency
  - Transmission Cost Allocation

# Stakeholder Feedback Form\*

Topic	Stakeholder	Comments	Proposals

\*Feedback concerning SM#4 Presentation can be emailed to [queuereform@duke-energy.com](mailto:queuereform@duke-energy.com) on or before October 4, 2019.

# APPENDIX

# Cluster Study Milestone Payments- Example

Project	Size (MW)	M1	M2 (after Phase 1 Study)			after M2	M3 (after Phase 2 Study)			after M3	M4 (at IA)	Upon COD
		Deposit	NU Payment	Deposit	total security	At-risk*	NU Payment	Deposit	total security	At-risk*	IC Facility	Security refund
D1	5	\$ 25,000	\$ 154,321	\$ 50,000	\$ 204,321	\$ 102,160	\$ 308,642	\$ 125,000	\$ 433,642	\$ 433,642	\$ 150,000	\$ 125,000
D2	2	\$ 22,000	\$ 61,728	\$ 44,000	\$ 105,728	\$ 52,864	\$ 123,457	\$ 110,000	\$ 233,457	\$ 233,457	\$ 150,000	\$ 110,000
T1	30	\$ 50,000	\$ 925,926	\$ 100,000	\$ 1,025,926	\$ 512,963	\$ 1,851,852	\$ 250,000	\$ 2,101,852	\$ 2,101,852	\$ 3,000,000	\$ 250,000
T2	50	\$ 70,000	\$ 1,543,210	\$ 140,000	\$ 1,683,210	\$ 841,605	\$ 3,086,420	\$ 350,000	\$ 3,436,420	\$ 3,436,420	\$ 4,000,000	\$ 350,000
T3	75	\$ 95,000	\$ 2,314,815	\$ 190,000	\$ 2,504,815	\$ 1,252,407	\$ 4,629,630	\$ 475,000	\$ 5,104,630	\$ 5,104,630	\$ 4,000,000	\$ 475,000
NU	\$ 50,000,000											

# Current State- External Reporting



## DEP Distribution External Queue Report 8/16/2019

Project Queue Number	Queue Number Issue Date	IR Interdependency Status	Operational Status	Engineering Administrative Designation	Capacity kW (AC)	Energy Source Type	Feeder Number	Substation Name
2019-07-18 12:37:00	7/18/2019	Project A Feeder	Fast Track Study - Study Complete	-	240.0	Solar	T1025B02	BYNUM 230KV
2019-06-26 11:42:00	6/26/2019	Project A Feeder	Construction - Pending Customer Obligation	-	100.8	Solar	T4990B36	METHOD 230KV
2019-06-26 11:48:00	6/26/2019	Project B Feeder	Supplemental Study - Study Complete	-	23.4	Solar	T0371B03	BEAVERDAM 115KV
2019-06-07 08:41:00	6/7/2019	Project Not Active	Withdrawn	-	34.2	Solar	T0371B03	BEAVERDAM 115KV
2019-06-05 09:05:00	6/5/2019	Project A Feeder	Supplemental Study - Pending Customer Response	-	30.2	Solar	T0810B07	SWANNANOA 115KV
2019-06-03 11:54:00	6/3/2019	Project Not Active	Withdrawn	-	828.0	Solar	T0781B01	SKYLAND 115KV
2019-04-23 08:04:00	4/23/2019	Project A Feeder	Construction - Under Construction / In Progress	-	50.0	Solar	T4530B06	APEX 230KV

# Proposed Future State- External Reporting

## DEP Distribution External Queue Report- Cluster

After cluster enrollment window closes, this column will be updated to include each project's assigned cluster and project number.

After cluster enrollment window closes, this column will be updated to include official assignment date for all projects entering into an assigned cluster.

Queue Assignment	Queue Assignment Date	IR Interdependency Status	Operational Status	Engineering Administrative Designation	Capacity kW (AC)	Energy Source Type	Feeder Number	Substation Name
CLUSTER 1- PROJECT #3	CLUSTER 1 ASSIGNMENT DATE		Cluster Study Phase #1		1950	Solar		

# Duke Energy Generator Interconnection

Webinar #1: Cost Allocation for Distribution and Transmission Projects

November 22, 2019





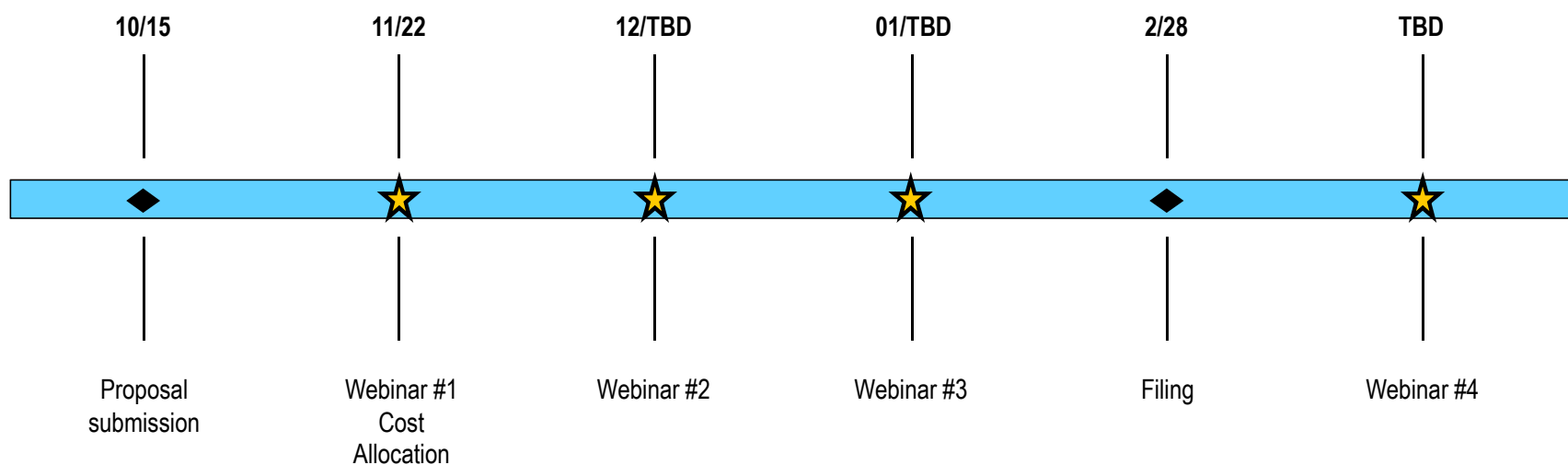
# Interconnection Queue Reform Objectives



- Increase efficiency of interconnection process and reduce size of interconnection queue
- Meet North Carolina commitment to pursue queue reform and propose workable framework
- Explore a common interconnection planning study approach for FERC jurisdictional and State jurisdictional projects
- Align rules and workflows by which both transmission and distribution projects are assessed
- Develop improved interconnection process by removing bottlenecks that cause queue backlogs
- Continue to ensure reliable and safe transmission and distribution systems that comply with NAESB, FERC, NERC, NESC, NEC, NC, SC, and FL standards

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# Interconnection Queue Reform Timeline



\*This timeline may be adjusted based on filing requirements

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## Current Challenges

- Due to the level of successful interconnections achieved to date, interconnection requests are becoming increasingly likely to trigger substantial network upgrades.
- The existing serial process prevents developers from sharing costs when large upgrades are required creating both market and system bottlenecks.

# Proposed Future State: T&D Cluster Study Benefits



## Process Improvement

- Process all interconnection requests simultaneously in one cluster on a concurrent basis
- Efficiently identify, coordinate, and process projects that do not adversely impact the Duke T&D systems

## T&D Alignment

- Evaluate the impacts of distribution connected projects on distribution facilities, providing more streamlined coordination of distribution upgrades
- Develop an improved process for assessing the impacts of transmission and distribution connected projects on transmission facilities and provide more efficient coordination of transmission upgrades

## Equitable Cost Allocation

- Equitably assign costs to projects (transmission and distribution) in the cluster study based on the relative impact of a project on a given facility that requires an upgrade

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# Cluster Impact Group Determination

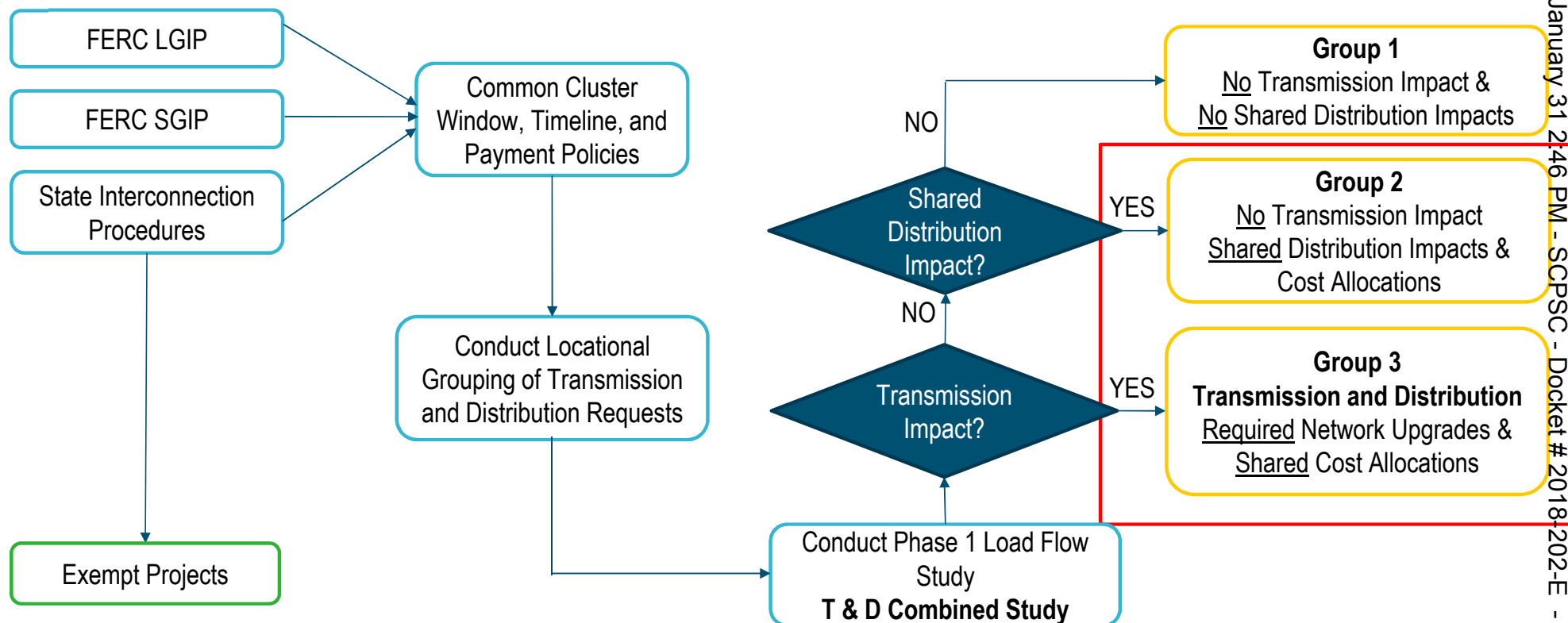


Request Window

Cluster Formation

Phase 1 Study

Cluster Processing



## **Goals of this Webinar:**

- Process flow
- Cost allocation methodology
  - Distribution level
  - Transmission level
- Application of methodology
  - Hypothetical feeder example
- Sample report
- Transparency into the cost allocation process
- Answer SH4 Cost Allocation Questions

## **Goals for Future Webinars:**

- Transition Plan
- Milestone payment and refund rates/structure
- Transparency as it relates to the aforementioned topics

## Stakeholder Comments



- What about moving state projects to FERC projects? How are these treated from cost stand point?
- Clarify the cost allocation methodology for transformer upgrades connecting Tx and Dx networks - how will they be different than line upgrades?
- If the network upgrade costs identified in the cluster are above a certain amount, will Duke consider making them capital investments?

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# Agenda of Topics



- Transmission Cost Allocation
  - ▢ Methodology
  - ▢ Application of methodology
  - ▢ Sample report
  - ▢ Exemptions
- Distribution Cost allocation
  - ▢ Methodology
  - ▢ Application of methodology
  - ▢ Sample report
- Recap
- Questions

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# Transmission Cost Allocation

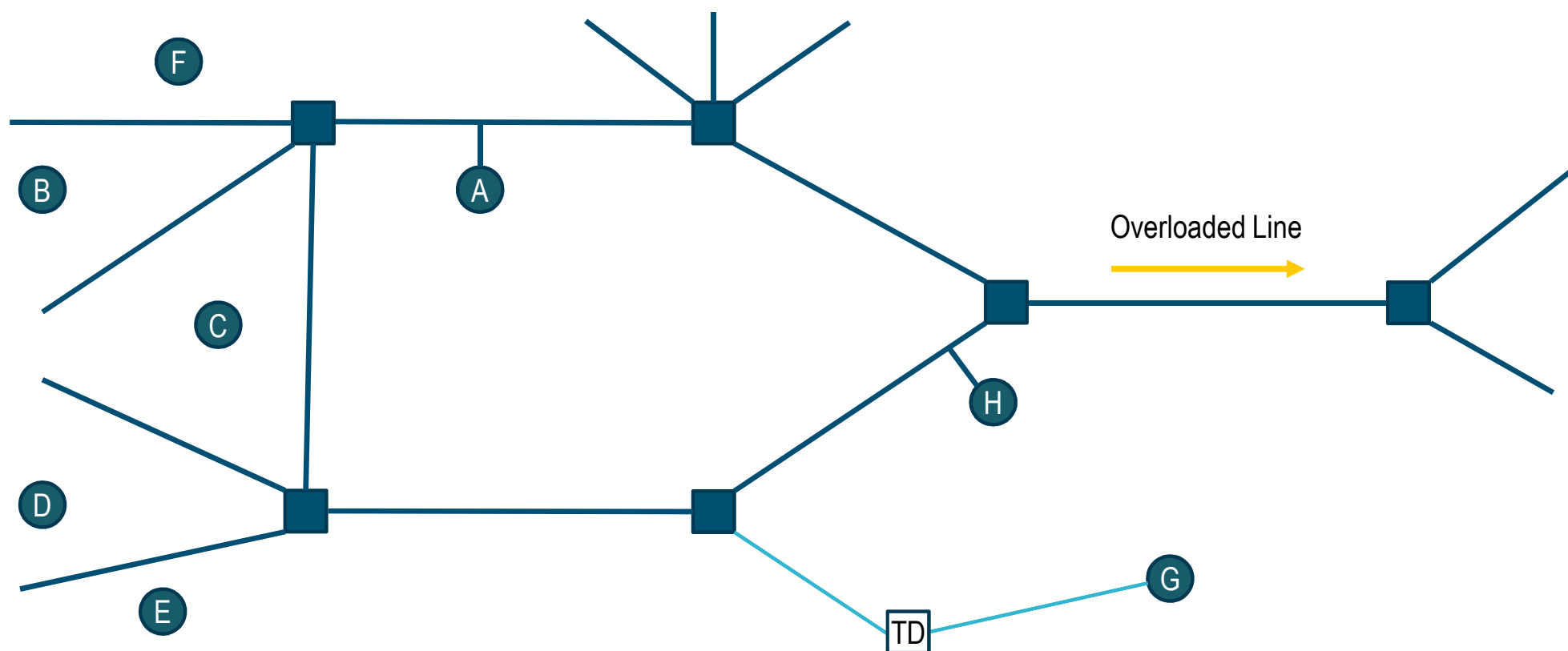
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## Cost Allocation for Transmission Upgrades

- Identify constrained facility (thermal) and worst condition
- Determine impact of projects on constrained facilities based on worst condition
  - ▢ Calculate Distribution Factor [**MW Impact / Generator MW Rating**]
  - ▢ Calculate Loading Impact [**MW Impact / Applicable Facility Rating**]
  - ▢ Calculate MW Impact [**Distribution Factor x Generator Rating (MW)**]
- Projects with Distribution Factor < 3% and Loading Impact < 1% on constrained facilities are exempt from cost allocation
- Cost for the required thermal upgrades will be allocated based on the individual project MW Impact divided by the Total MW Impact for all projects subject to cost allocation.

# Network Impacts of Generation Interconnections



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# Network Upgrade Cost Allocation - Example



Project	Generator Rating (MW)						
A	100						
B	200						
C	50						
D	400						
E	750						
F	20						
G	5						
H	1						
Total	-						

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# Network Upgrade Cost Allocation - Example



Project	Generator Rating (MW)	Distribution Factor (%) Exemption Criteria: < 3%					
A	100	4					
B	200	3					
C	50	2					
D	400	2.5					
E	750	2.67					
F	20	1					
G	5	20					
H	1	50					
Total	-	-					

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# Network Upgrade Cost Allocation - Example



Project	Generator Rating (MW)	Distribution Factor (%) Exemption Criteria: < 3%	Loading Impact (%) Exemption Criteria: < 1%				
A	100	4	2				
B	200	3	3				
C	50	2	0.5				
D	400	2.5	5				
E	750	2.67	10				
F	20	1	0.1				
G	5	20	0.5				
H	1	50					

# Network Upgrade Cost Allocation - Example



Project	Generator Rating (MW)	Distribution Factor (%) Exemption Criteria: < 3%	Loading Impact (%) Exemption Criteria: < 1%	MW Impact			
A	100	4	2	4			
B	200	3	3	6			
C	50	2	0.5	1			
D	400	2.5	5	10			
E	750	2.67	10	20			
F	20	1	0.1	0.2			
G	5	20	0.5	1			
H	1	50					

# Network Upgrade Cost Allocation - Example



Project	Generator Rating (MW)	Distribution Factor (%) Exemption Criteria: < 3%	Loading Impact (%) Exemption Criteria: < 1%	MW Impact	MW Impact for Cost Allocation		
A	100	4	2	4	4		
B	200	3	3	6	6		
C	50	2	0.5	1	Exempt		
D	400	2.5	5	10	10		
E	750	2.67	10	20	20		
F	20	1	0.1	0.2	Exempt		
G	5	20	0.5	1	1		
H	1	50					



# Network Upgrade Cost Allocation - Example



Project	Generator Rating (MW)	Distribution Factor (%) Exemption Criteria: < 3%	Loading Impact (%) Exemption Criteria: < 1%	MW Impact	MW Impact for Cost Allocation	Cost Allocation (%) = MW Impact / Total MW Impact	
A	100	4	2	4	4	9.64%	
B	200	3	3	6	6	14.46%	
C	50	2	0.5	1	Exempt	0%	
D	400	2.5	5	10	10	24.10%	
E	750	2.67	10	20	20	48.19%	
F	20	1	0.1	0.2	Exempt	0%	
G	5	20	0.5	1	1	2.41%	
H	1	50					

# Network Upgrade Cost Allocation - Example



Project	Generator Rating (MW)	Distribution Factor (%) Exemption Criteria: < 3%	Loading Impact (%) Exemption Criteria: < 1%	MW Impact	MW Impact for Cost Allocation	Cost Allocation (%) = MW Impact / Total MW Impact	Cost Allocation (\$ MM) = Cost Allocation (%) × Upgrade Cost
A	100	4	2	4	4	9.64%	\$4.82 MM
B	200	3	3	6	6	14.46%	\$7.23 MM
C	50	2	0.5	1	Exempt	0%	0
D	400	2.5	5	10	10	24.10%	\$12.05 MM
E	750	2.67	10	20	20	48.19%	\$24.10 MM
F	20	1	0.1	0.2	Exempt	0%	0
G	5	20	0.5	1	1	2.41%	\$1.20 MM
H	1	50					

# Distribution Cost Allocation

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## Proposed Future State: Distribution Cost Determination



Cost allocation for distribution connected projects will be determined in **three** ways:

- Network Upgrade Cost ✓
- Distribution System Upgrade Cost
- Interconnection Facilities

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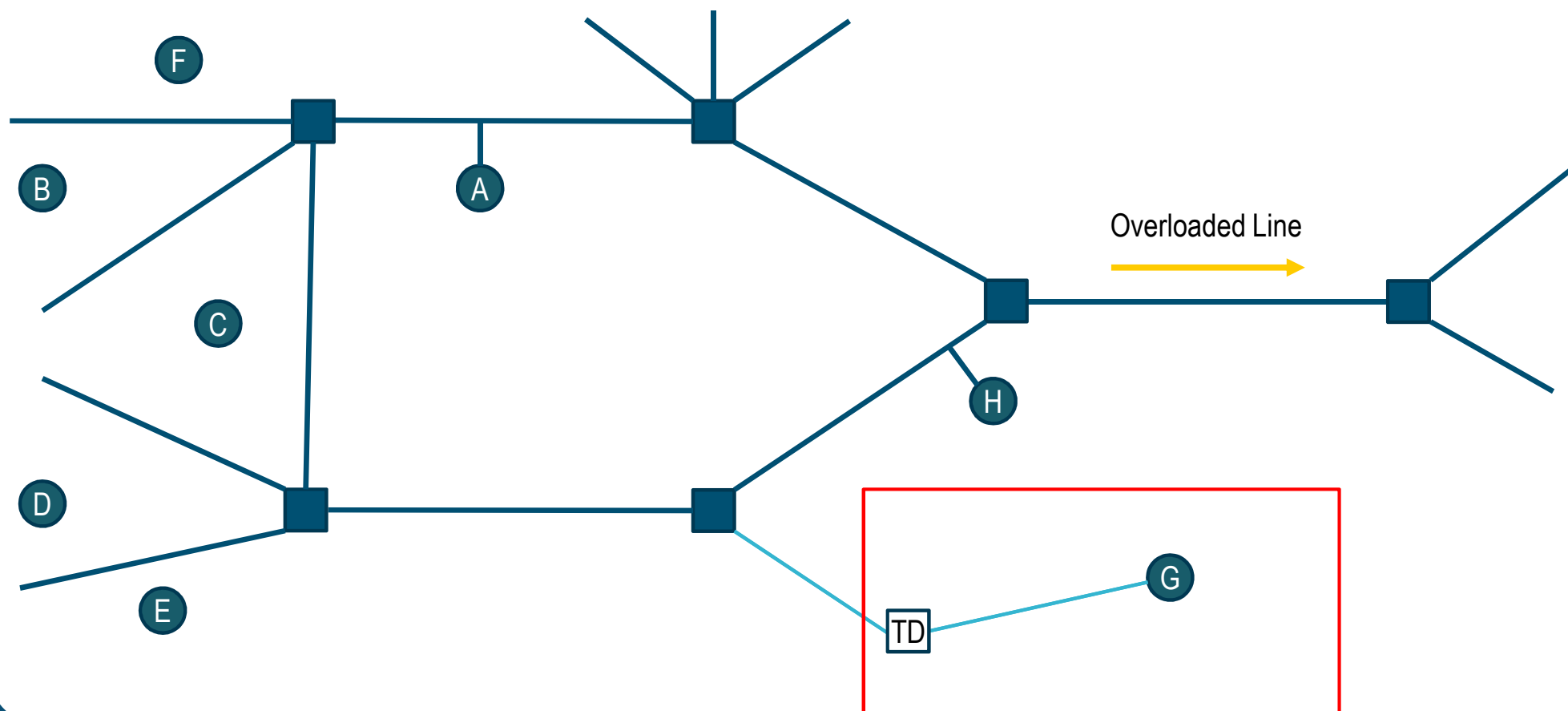
# Distribution Upgrade Cost Allocation



Transformer/Substation Bank Upgrades	Per MW basis
Distribution Line Work (e.g. reconductor)	Per MW basis, based on location (% use of upgrade)
Distribution System Protection Upgrades	Per count of projects on feeder
Relaying Upgrades for Anti-Islanding Protection	Per count of projects on substation
Communication Medium for Anti-Islanding Protection	Per count of projects, based on location (% use of upgrade)
Interconnection Facilities	Per count of projects

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# Network Impacts of Generation Interconnections



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## Distribution Cost Sharing ▯ Line Work

- Reconductoring required between the Substation and Project 3. Impacts are driven based on the MW output of a DER facility. Therefore, costs are allocated on a per MW basis.
- Total upgrade cost = \$ 800,000



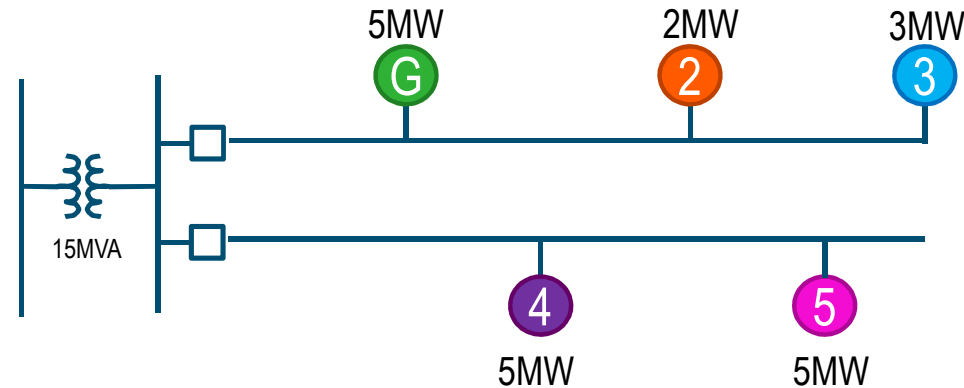
- $$\text{Allocated Cost} = \text{Line Section Upgrade Cost} * \frac{\text{Project MW Contribution}}{\text{Total MW Impact}}$$
- Project G Cost =  $\$200,000 * \frac{5MW}{10MW} = \$100,000$
- Project 2 Cost =  $\left( \$200,000 * \frac{2MW}{10MW} \right) + \left( \$400,000 * \frac{2MW}{5MW} \right) = \$200,000$
- Project 3 Cost =  $\left( \$200,000 * \frac{3MW}{10MW} \right) + \left( \$400,000 * \frac{3MW}{5MW} \right) + \left( \$200,000 * \frac{3MW}{3MW} \right) = \$500,000$

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## Distribution Cost Sharing ▯ Transformer Upgrade



- 15MVA substation transformer overloaded with requested DER. Upgraded capacity needed to accommodate all DER. Also, allocated on a per MW basis.
- Total upgrade cost = \$5,000,000



- Cost allocation similar to reconductoring example
- Project G Cost =  $\$5,000,000 * \frac{5MW}{20MW} = \$1,250,000$
- Project 2 Cost =  $\$5,000,000 * \frac{2MW}{20MW} = \$500,000$
- Project 3 Cost =  $\$5,000,000 * \frac{3MW}{20MW} = \$750,000$
- Project 4 Cost =  $\$5,000,000 * \frac{5MW}{20MW} = \$1,250,000$
- Project 5 Cost =  $\$5,000,000 * \frac{5MW}{20MW}$

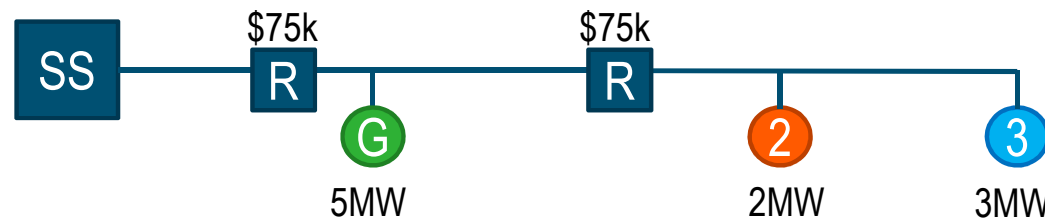
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## Distribution Cost Sharing ▯ Protection Upgrade

- Protective device upgrades needed in order to accommodate DER facilities. Impact is based on the presence of the DER facility. Therefore, costs are allocated on a per project basis.
- Total upgrade cost = \$150,000



- $$\text{Allocated Cost} = \frac{\text{Device Upgrade Cost}}{\text{Total \# of Projects Impacting}}$$
- Project G Cost =  $\frac{\$75,000}{3 \text{ Projects}} = \$25,000$
- Project 2 Cost =  $\frac{\$75,000}{3 \text{ Projects}} + \frac{\$75,000}{2 \text{ Projects}} = \$62,500$
- Project 3 Cost =  $\frac{\$75,000}{3 \text{ Projects}} + \frac{\$75,000}{2 \text{ Projects}} = \$62,500$

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# Distribution Cost Allocation Example ☐

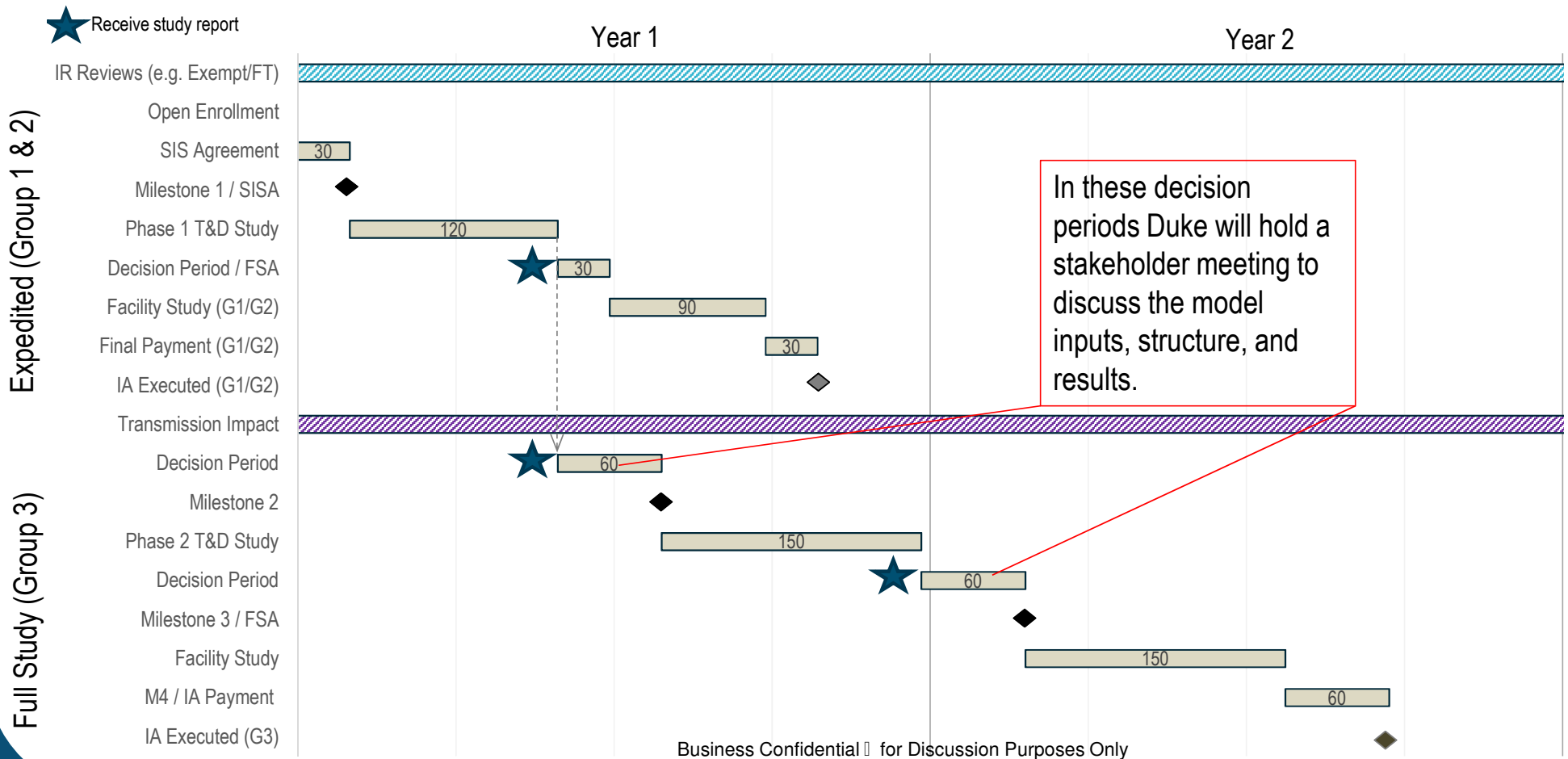
## Phase 1 Study Report - Accounting



<u>Cost Upgrade Assignments for Project G</u>	<u>Calculation</u>	<u>Cost Assignment</u>
1. Distribution Line Work	\$200,000*(5MW/10MW)	\$ 100,000
2. Transformer Upgrade	\$5,000,000*(5MW/20MW)	\$ 1,250,000
3. Protection	\$75,000/(3 Projects)	\$ 25,000
4. Transmission	\$50,000,000*(1MW/40.7MW)	\$ 1,230,000
T & D TOTAL		\$ 2,605,000

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# Cluster Study Process Timeline- Network Upgrade Meeting



# Stakeholder Comments



- What about moving state projects to FERC projects? How are these treated from cost stand point?
  - ▮ Allocation methodology does not differentiate between state and FERC projects. Milestone payment conversation for a future webinar.
- Clarify the cost allocation methodology for transformer upgrades connecting Tx and Dx networks - how will they be different than line upgrades?
  - ▮ T-T transformers will be allocated based on the T methodology — both T and D projects are subject to it.
  - ▮ T-D transformers will be allocated based on the D methodology — only D projects are subject to it. T-D transformers are radial, just like the D feeders and the D projects on them. As such, we don't believe there is a scenario where a T project would share the cost of a T-D transformer.
  - ▮ See distribution allocation slides
- If the network upgrade costs identified in the cluster are above a certain amount, will Duke consider making them capital investments?
  - ▮ Yes, this is already a practice in CPRE with an economic test applied. We would be unlikely to do this for PURPA projects.

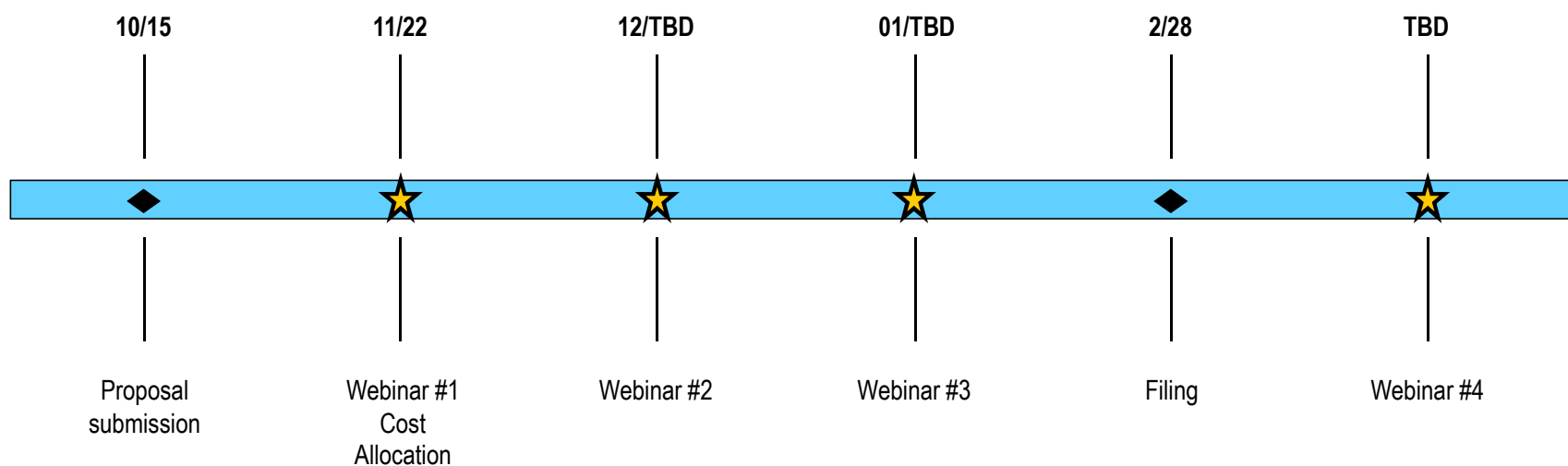
## **Goals of this Webinar:**

- Process flow
- Cost allocation methodology
  - Distribution level
  - Transmission level
- Application of methodology
  - Hypothetical feeder example
- Sample report
- Transparency into the cost allocation process
- Answer SH4 Cost Allocation Questions

## **Goals for Future Webinars:**

- Transition Plan
- Milestone payment and refund rates/structure
- Transparency as it relates to the aforementioned topics

# Interconnection Queue Reform Timeline



\*This timeline may be adjusted based on filing requirements

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# Questions



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# Duke Energy Generator Interconnection

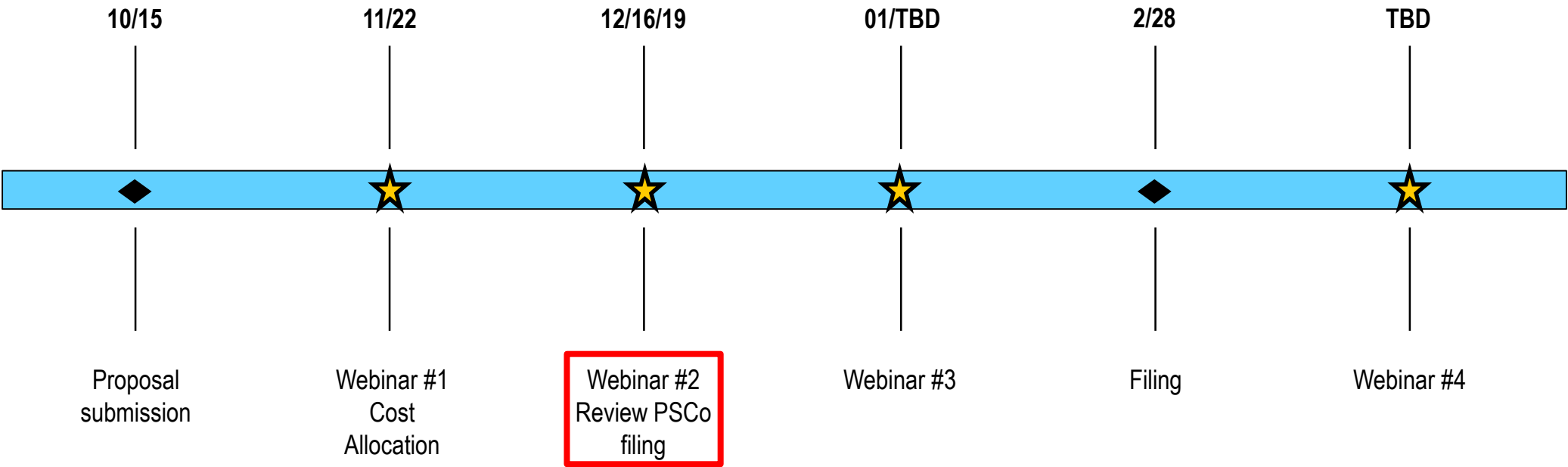
Webinar #2: Review 12/4/19 FERC Order on PSCo Filing

December 16, 2019





# Interconnection Queue Reform Timeline



\*This timeline may be adjusted based on filing requirements

## FERC Order on PSCo Tariff Filing

- On September 9, 2019, PSCo submitted proposed revisions to its Large Generator Interconnection Procedures (LGIP) and Large Generator Interconnection Agreement (LGIA) to address the backlog of over 22,000 MW of generation interconnection requests in its queue.
- On December 4, 2019, FERC accepted in part and rejected in part the proposed revisions.
  - **Accepted** PSCo's proposed revisions to its LGIP and LGIA providing for a transition from a serial first-come, first-served approach to a clustered first-ready, first-served approach.
  - **Rejected**, as severable from the remainder of PSCo's proposal, PSCo's request for an exemption from 18 C.F.R. § 35.19(a)(2) concerning the calculation of interest on cash security.

## Goals for this webinar:



1. Review the recent FERC-approved PSCo queue reform process.
2. Create an open dialogue about what stakeholders favor in the FERC decision and what they have concerns about.
3. Understand how stakeholders view the PSCo ruling in relation to the current queue reform effort.

- Timeline / Context
- FERC determinations
  - Informational Interconnection Studies
  - Definitive Interconnection Study Process
  - Study Deposits
  - Cost Allocation
  - Financial Security
  - Readiness Milestones
  - Withdrawal Penalties
  - Modifications to the LGIA
  - Site Control
  - Transition Process
- Recap

# Informational Interconnection Studies

9-10

- Potential customers may enter into an **optional, customizable study intended to help evaluate their project's interconnection feasibility** prior to entering the interconnection queue.
  - Replaces optional study from the Order No. 2003 *pro forma*
- Customers will be able to request that PSCo perform this study at any time.
- “Informational Interconnection Study will allow the interconnection customer to study almost any interconnection scenario as well as the effect of other clustered generation on a specific interconnection request.”
- The study will be performed **at the interconnection customer's expense**- \$10,000 deposit subject to true-up based on actual costs.

# Definitive Interconnection Study Process- Enrollment

11-13

- The Definitive Interconnection Study Process consists of a **clustered Definitive Interconnection System Impact Study (DISIS)** and **individual interconnection facilities studies**.
- To enter the clustered DISIS, customers must submit a **valid interconnection request** before the close of the window.
  - **Two windows will be opened annually.**
  - Each window will be open for a 45-day period (opening February 1 and August 1)



- Requirements for a valid IR:
  - (1) non-refundable application fee of \$5,000 **and a study deposit**;
  - (2) a completed application, including applicable technical information needed for modeling;
  - (3) a demonstration of 50 percent site control;
  - (4) a point of interconnection;
  - (5) the point of delivery if the request is for network resource interconnection service;
  - (6) the generating facility size in MW;
  - (7) the first readiness milestone (or financial security in lieu of the readiness milestone); and
  - (8) financial security equal to (and in addition to) the study deposit.

# Definitive Interconnection Study Process- Resource Solicitation Clusters

14

# Definitive Interconnection Study Process- Resource Solicitation Clusters (14)



- Resource Solicitation Clusters- a cluster study separate from clusters initiated through the DISIS Window **intended to study projects that the resource planning entity is considering to acquire** pursuant to a process authorized or required by Applicable Laws and Regulations for the acquisition of Network Resources.
- Resource planning entities may request a Resource Solicitation Cluster at any time, and PSCo will work with that resource planning entity to determine the scope and timeline to initiate the Resource Solicitation Cluster.
- Resource Solicitation Clusters will respect the queue position of any ongoing cluster studies.
- The study process and requirements for interconnection requests in a Resource Solicitation Cluster and a DISIS Cluster are the same.
- Participants will retain a queue position in both cluster types (i.e., the Resource Solicitation Cluster and DISIS Cluster) during the first two phases of the Resource Solicitation Cluster, consistent with PSCo's existing LGIP.

# Definitive Interconnection Study Process- Cluster Engagement Window

15-16

# Definitive Interconnection Study Process- Cluster Engagement Window (15-16)



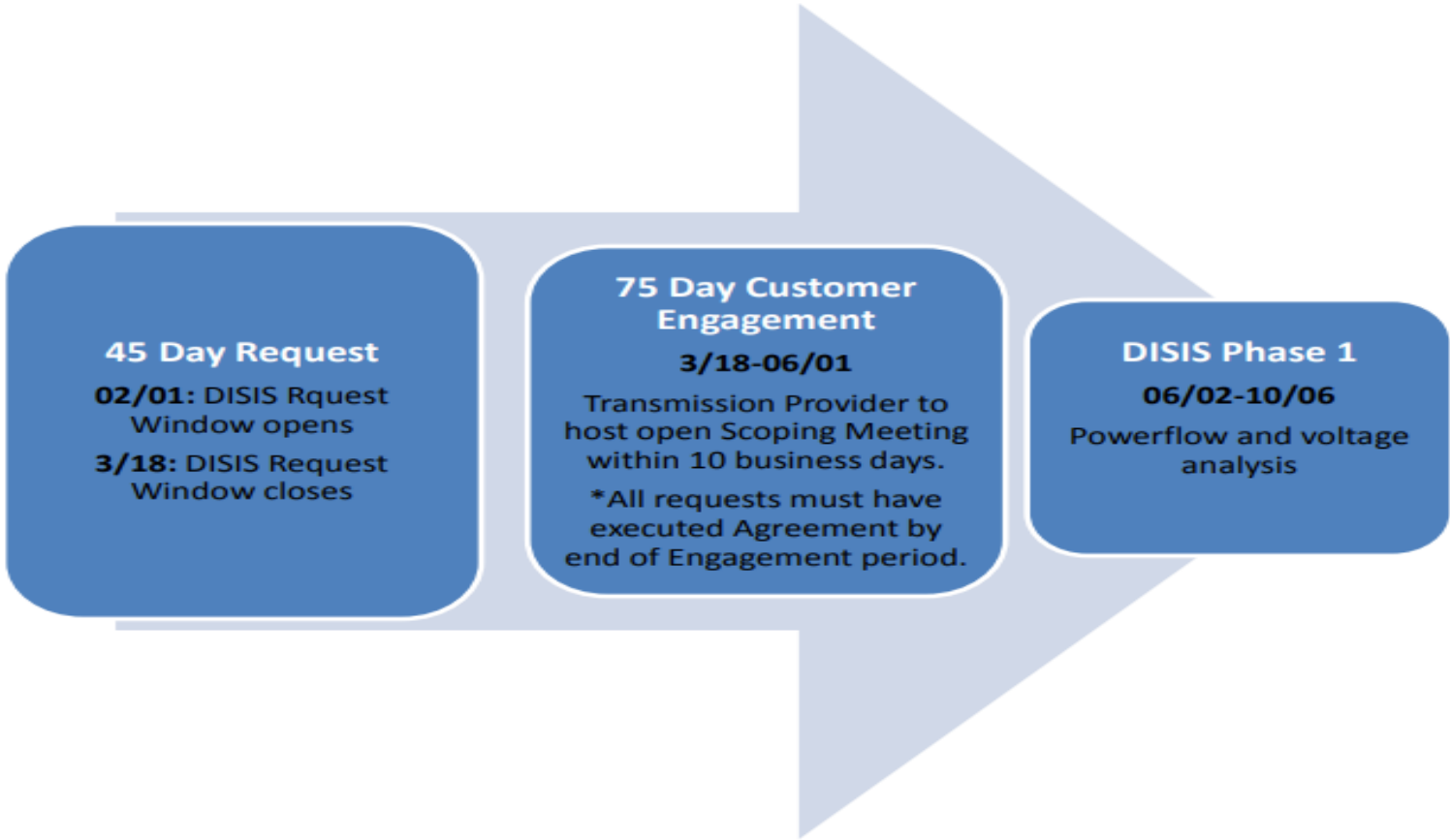
- **A 75-day customer engagement window will begin after interconnection customers submit their interconnection requests** and before the start of the Definitive Interconnection Study Process for each cluster.
- **During this window, PSCo will work with interconnection customers to build models, verify data, hold stakeholder meetings, and generally prepare for the DISIS.**
- Within 10 business days of the window opening, PSCo will publish a list of all interconnection requests for that cluster to OASIS.
- In this phase, customers will not have signed a study agreement (DISIS agreement), and any study deposits provided with the interconnection request will be fully refundable without penalty.
- At the end of this window, all interconnection customers with a complete interconnection request and a signed DISIS agreement will be included in that DISIS Cluster and PSCo will initiate the Definitive Interconnection Study Process.

# PSCo Exhibit to September 2019 Filing- Spring Enrollment Window



## Timeline: Appendix A-1 – Spring Window

These dates are for illustrative purposes only



# Definitive Interconnection Study Process

17-20

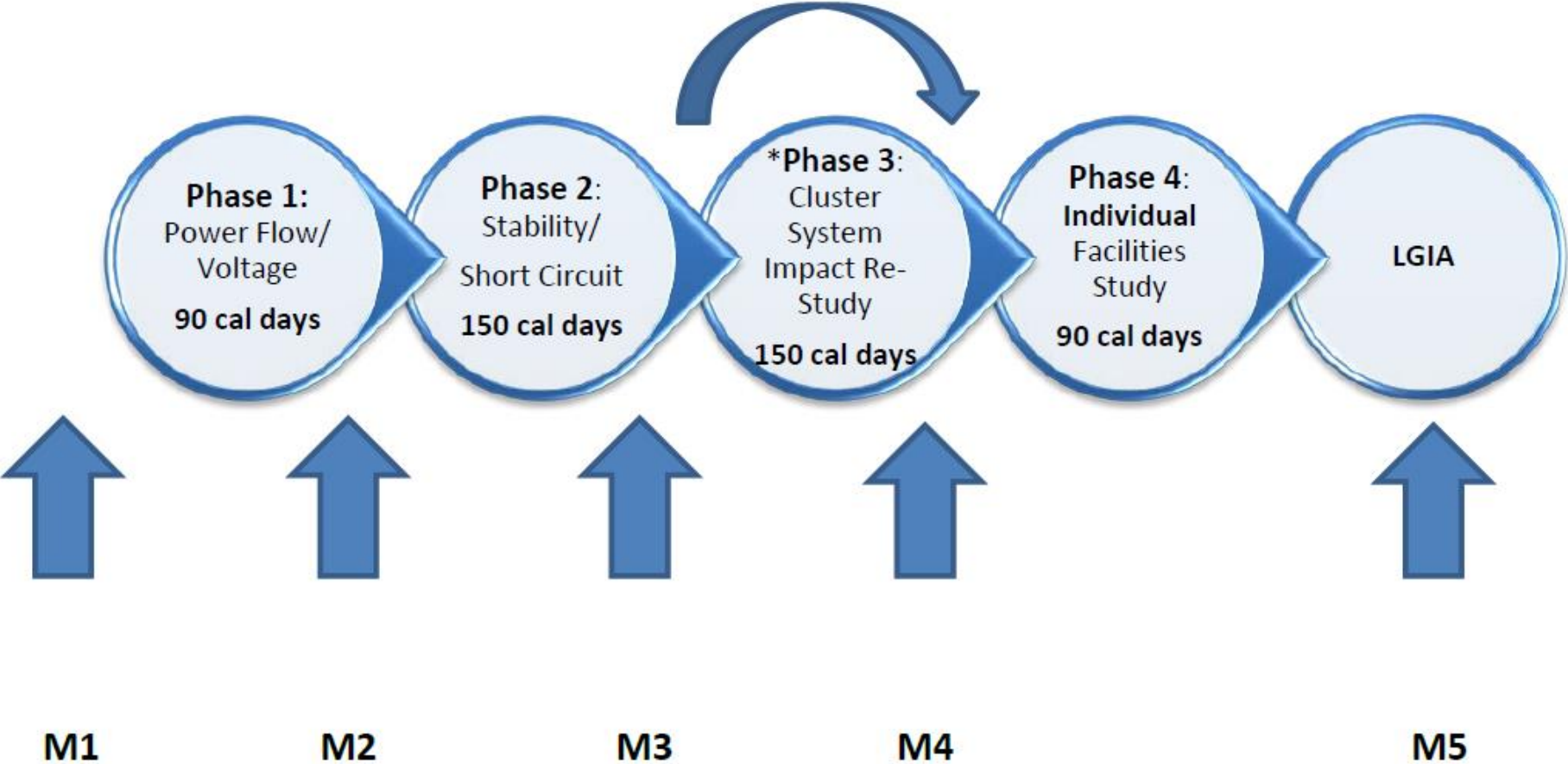
- Consists of three DISIS phases, followed by an individual interconnection facilities study phase.
  - **Phase 1** (90 days)- initial power flow and voltage study **expected to identify the majority of required network upgrades**. The results will provide the interconnection customer with an initial look at its costs to interconnect.
  - **Phase 2** (150 days)- a stability and short circuit study
  - **Phase 3** (150 days)- restudy if necessary due to withdrawals (i.e., the power-flow, voltage, stability, and short circuit analysis)
  - **Phase 4** (90 days)- the individual interconnection facilities studies
- Demonstrations of readiness will be required in the form of readiness milestones (Milestones 1-5) and increasing levels of Site Control must be satisfied before moving to the next phase.



# PSCo Exhibit to September 2019 Filing- Definitive Interconnection Study Process



**Definitive Interconnection Study Process and Approximate Timeline for the First DISIS Cluster**



## Study Deposits

31-32

# Study Deposits (31-32)

- An interconnection customer must make the following study deposits prior to entering the interconnection queue:
  - \$75,000 for requests between 20 MW-50 MW;
  - \$150,000 for requests of 50-200 MW; and
  - \$250,000 for requests of 200 MW and greater.
- Study deposits would be applied to interconnection customer's share of the Definitive Interconnection Study Process costs
- Study costs will be allocated to cluster study participants with 50% based on the number of interconnection requests in the cluster and 50% based on the requested megawatts in the cluster.
- Differences between the actual cost of study and study deposit will be charged or refunded as applicable.
- Excess study deposit amounts would not be offset against the cost of any future interconnection studies.

## Network Upgrades

33-34

# Network Upgrades (33-34)



- Costs for **station equipment network upgrades**, including all switching stations, **will be allocated equally** among interconnection customers based on the number of generating facilities interconnecting at an individual station.
- If multiple customers are connecting to the transmission provider's system through a single interconnection customer's interconnection facility, those interconnection customers will be considered one interconnection customer.
- Costs of **shared transmission provider's interconnection facilities** **will be allocated equally** among interconnection customers based on the number of generating facilities sharing that transmission provider's interconnection facility.
- All **other network upgrades** will be allocated based on the **proportional impact** of each individual generating facility in the cluster study as follows:
  - (1) transmission lines and transformers identified as network upgrades will be allocated using distribution factor analysis;
  - (2) voltage support related network upgrades will be allocated using a voltage impact analysis; and
  - (3) network upgrades associated with existing breakers not physically located at the substation to which the generating facility is interconnecting, or associated with a new transmission facility, will be allocated based on short circuit analysis.

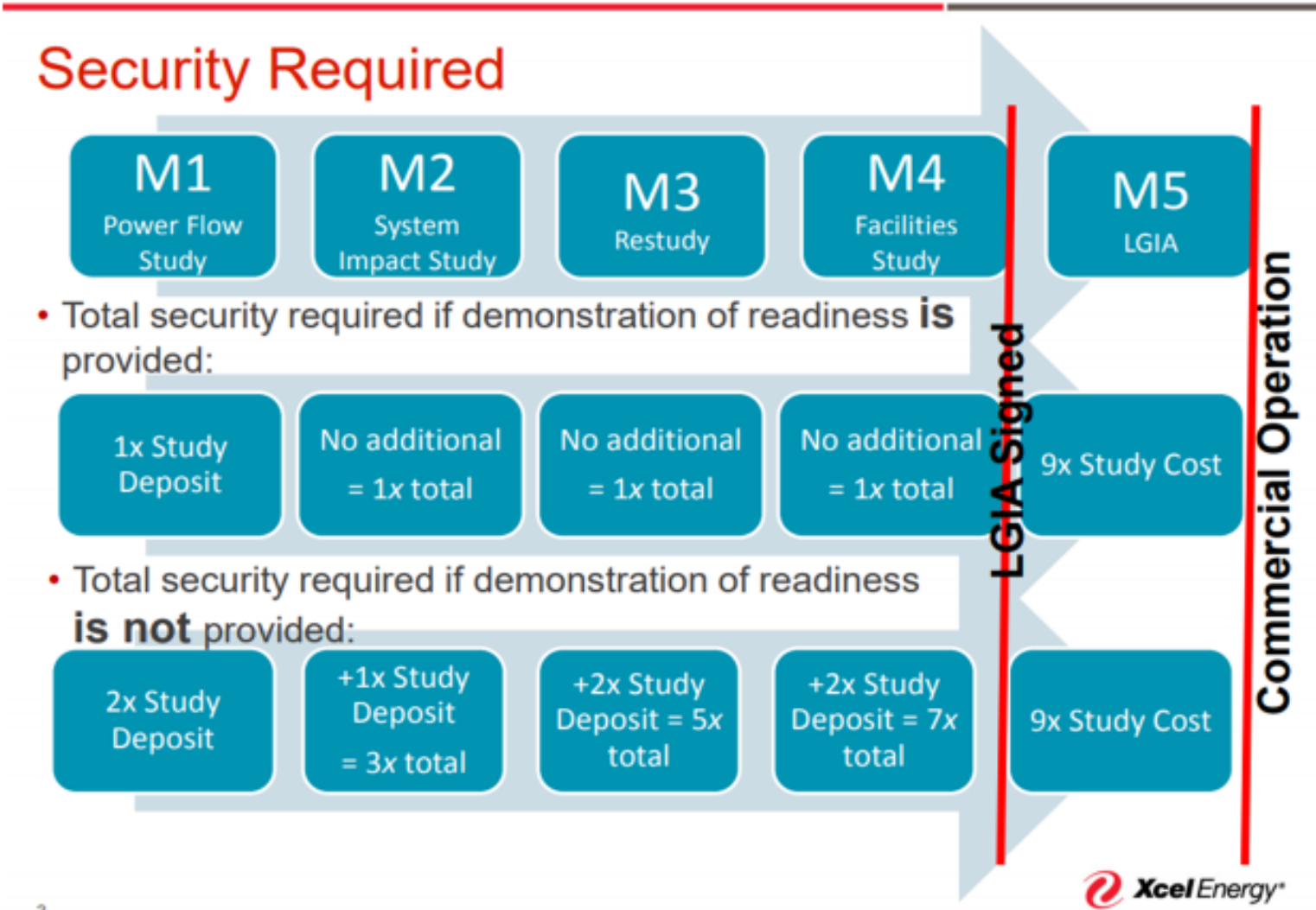
## Financial Security and Readiness Milestones

37-43

- All interconnection customers will be required to post **financial security** equal to the study deposit amount as part of a valid interconnection request
- A series of **readiness milestones** will require completion to move through the Definitive Interconnection Study Process.
- FERC-approved **non-financial readiness demonstration options**: (1) Contract for Sale, (2) Inclusion in a Resource Plan or Resource Solicitation Process, and (3) Provisional Service
- Additional Financial Security- As an alternative to other demonstration options, **customers may also demonstrate readiness by providing additional financial security** in the amounts of one, two, four, and six times the study deposit for Milestones 1 through 4 respectively. This financial security is in addition to the financial security required as part of a valid interconnection request
- **At Milestone 5**, all interconnection customers will be required to **provide financial security equal to nine times the interconnection customer's share of the Definitive Interconnection Study Process costs.**



# PSCo Exhibit to September 2019 Filing- Financial Security Required





## Withdrawal Penalty

44-46

# Withdrawal Penalty (44-46)

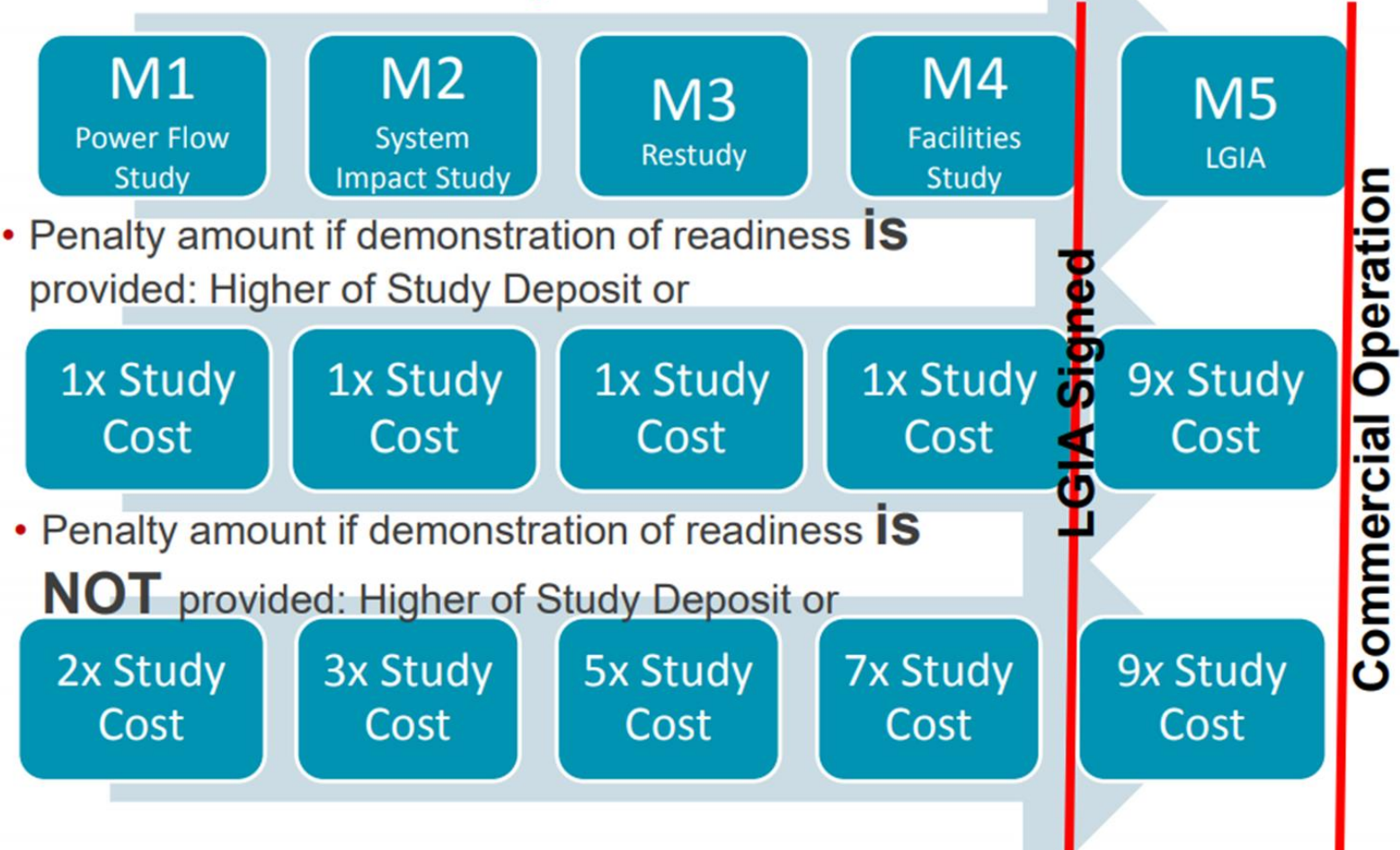


- Customers **will not** be subject to a withdrawal penalty if:
  - (1) the withdrawal does not **negatively affect the timing or cost** of equal or lower queued projects;
  - (2) the cost responsibility for **transmission upgrades** identified for the withdrawing customer **increases more than 25 percent between the prior and the current study reports**; *or*
  - (3) the cost responsibility for **transmission upgrades** identified for the withdrawing customer **increases by more than 100 percent between the Phase 2 and Phase 4 reports**.
- If a withdrawal **negatively impacts** other customers *and* the **upgrade costs did not increase significantly between studies** or over the study process, customers **will** be subject to withdrawal penalty dependent on the customer's performance of readiness demonstrations and phase of withdrawal (next slide).
- Withdrawal penalty revenue will be used to fund interconnection study costs for other interconnection customers in the same cluster as the withdrawing customer- 50 % based on the number of interconnection requests in the cluster and 50% based on the requested MWs in the cluster.
- If withdrawal penalty revenues remain after funding restudies for interconnection customers in the same cluster, PSCo will distribute the remaining penalty revenue to restudies for subsequent clusters. PSCo will not keep any portion of the withdrawal penalty nor use any of the withdrawal penalty to fund network upgrades. PSCo will post the balance of the withdrawal penalty account on OASIS.

# PSCo Exhibit to September 2019 Filing- Withdrawal Penalty



## Withdrawal Penalty



## Site Control

53-55

# Site Control (53-55)



- Site Control will serve as an additional demonstration of readiness.
- **Demonstrations of Site Control that gradually increase at each milestone will be required** to move through the Definitive Interconnection Study Process (next slide).
- Site Control will need to be of sufficient size to construct and operate a generating facility as well as to deliver the output along the interconnection customer's interconnection facilities.
- Customers must have the exclusive right to occupy the site.
- Customers **will not have the option to provide a \$10,000 deposit** in lieu of a demonstration of Site Control.

# PSCo Exhibit to September 2019 Filing- Site Control



Exhibit XES-203  
Page 2 of 8

Milestone	Total Security Required (Multiple of Section 3.1 Study Deposit)  If Demonstration of Readiness <u>IS</u> Provided	Total Security Required (Multiple of Section 3.1 Study Deposit)  If Demonstration of Readiness <u>IS</u> <u>NOT</u> Provided	Demonstration of Site Control for All Fuel Types	Site Control of ICIF's
M1	1x	2x	50%	0%
M2	1x	3x	50%	0%
M3	1x	5x	60%	0%
M4	1x	7x	75%	0%
M5	9x	9x	90%	50%

## LGIA Modifications

59-61



# LGIA Modifications Placeholder (59-61)



- Article 2.3.1 Termination Procedures; Written Notice (Revision) - If a generating facility, or a portion of a generating facility, **does not reach commercial operation by the initial commercial operation date** provided in the initial interconnection request in accordance with section 4.4.5 of the LGIP, then the **transmission provider may terminate the LGIA** or the portion of the LGIA associated with the part of the generating facility that does not reach commercial operation.
- Article 5.16.1 Effect of Suspension; Effect of Missed Interconnection Customer LGIA Milestones (Addition)-
  - Customers **will not be able miss a milestone for the purposes of circumventing initiation of suspension** provisions under the LGIA.
- Article 5.16.2 Effect of Suspension; Parties Obligations (Addition)-
  - All upgrade construction is suspended during suspension;
  - Applicable Appendices of the LGIA may be revised to account for construction sequencing and milestones modified due to suspension; and
  - Maintenance of Site Control is required during suspension.



## Transition Process

64-65

# Transition Process (64-65)



- To transition interconnection customers into the first-ready, first-served process, FERC approved the following three options for projects in the current PSCo queue:
  - (1) the **transitional serial process**- customers with a final system impact study report and an interconnection facilities study agreement signed prior to September 27, 2019, are eligible to enter the transitional serial process.
  - (2) the **transitional cluster process**- customers with an assigned queue position prior to September 27, 2019, are eligible to enter the transitional cluster process.
  - (3) **withdrawal** from the queue and reentry into the queue in a future DISIS Cluster.

# Transition Process (65)



ELECTRONICALLY FILED - 2020 January 31 2:46 PM - SCPSC - Docket # 2018-202-E - Page 17 of 217

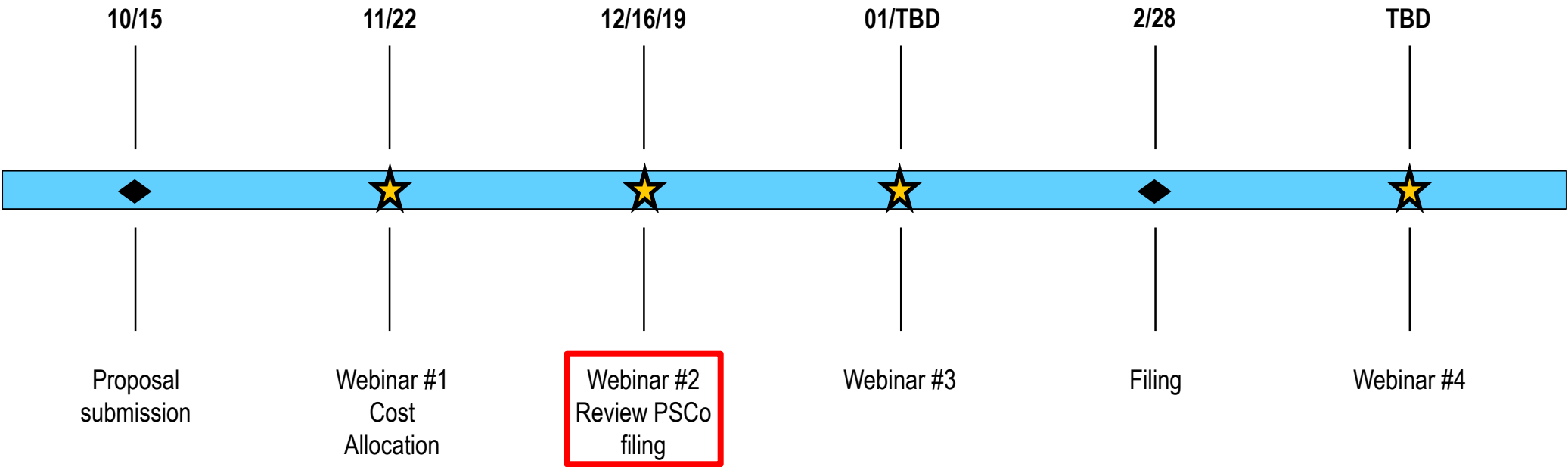
- In order **to enter the transitional serial or the transitional cluster process**, a project **must demonstrate readiness** by:
  - (1) providing a deposit for transmission provider's interconnection facilities and network upgrades;
  - (2) demonstrating exclusive Site Control;
  - (3) signing a transitional interconnection agreement; and
  - (4) providing one of the following: (1) an executed contract for sale of the generating facility or its energy, where the term of the sale is not less than five years; (2) evidence that the generating facility is included in an approved Resource Plan or Resource Solicitation Process; or (3) an unsuspended, filed Provisional LGIA that includes a commitment to construct the facility.
- Interconnection customers **must make this readiness demonstration during a 30 day window from the effective date of the tariff**. Customers that are not fully ready to proceed on January 6, 2020, will have the option of reentering the queue through the first regular DISIS Window, which will be open from February 1, 2020 through March 18, 2020
- Customers entering the transition processes will be required to **make study deposits for 100% of the costs identified in the system impact study report for the serial transition process, and \$5 million to be reconciled with the costs determined in the transitional cluster study for the transitional cluster process**. If the interconnection customer withdraws or otherwise does not reach commercial operation, PSCo will refund the deposit after the customer has paid the study costs and the withdrawal penalty equal to nine times the interconnection customer's total study costs

## Recap of goals for this webinar:



1. Review the recent PSCo FERC approved PSCo queue reform process.
2. Have an open dialogue about what stakeholders favor in the FERC decision and what they have concerns about.
3. Understand how stakeholders view the PSCo ruling in relation to the current queue reform effort.

# Interconnection Queue Reform Timeline



\*This timeline may be adjusted based on filing requirements

# Questions



# Duke Energy Interconnection Queue Reform Stakeholder Meeting #7

January 29, 2020



# Goals and Agenda for the Meeting

## Goals

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- Review the updated Duke queue reform process
- Open dialogue about what stakeholders favor in the proposal and what they have concerns about
- Understand how stakeholders view the proposed queue reform effort

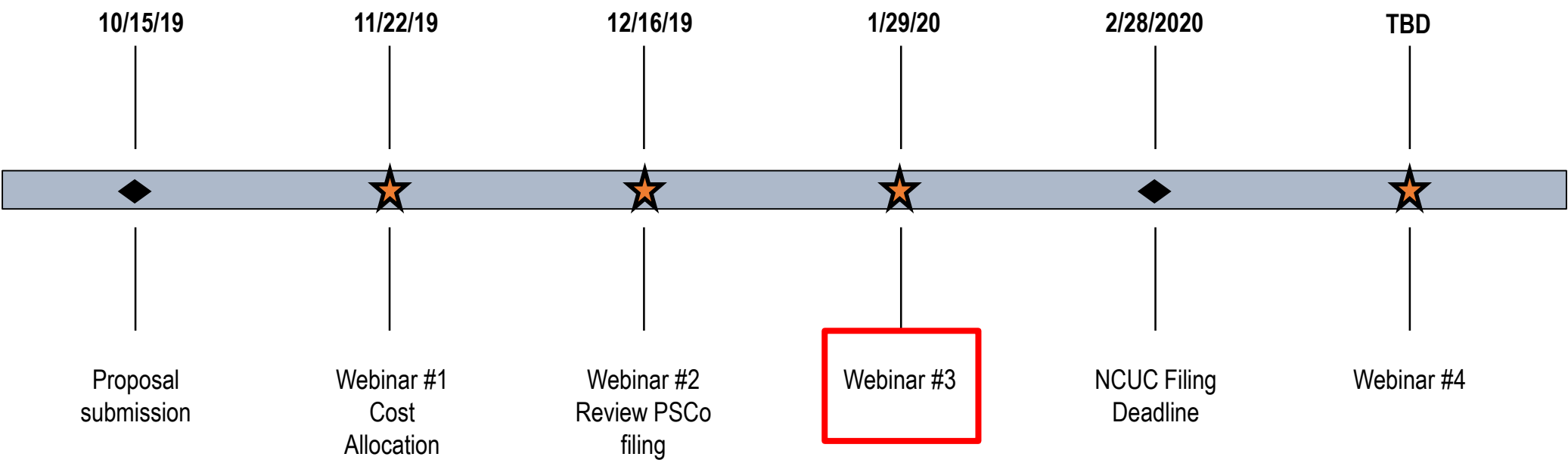
## Agenda

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1. Welcome, Safety & Logistics
  2. Revised Queue Reform Plan
    - Implementation Timeline
    - Informational Interconnection Studies
    - Definitive Interconnection Study Process
    - Study Deposits
    - Cost Allocation
    - Financial Security
    - Readiness Milestones
    - Withdrawal Penalties
    - Site Control
    - Transition Process
  3. Wrap-up and Next Steps
-



# Implementation Timeline\*



\*This timeline may be adjusted based on filing requirements

# Informational Interconnection Studies (Optional)

- Potential customers may opt into an optional, customizable study intended to help evaluate their project's interconnection feasibility prior to entering the interconnection queue.
- Customers will be able to request Duke Energy perform this study at any time.
- The study will be performed at the interconnection customer's expense-\$10,000 deposit subject to true-up based on actual costs.
- Study will utilize existing base cases presented in Interconnection Queue Stakeholder Forums
- Duke will identify contract engineering firm responsible for performing informational study. This firm will be selected with stakeholder and Commission feedback, and contracts with the firm will be reviewed biennially.
- Studies and cost estimates produced in informational study process are not binding.

# Definitive Interconnection Study Process- Enrollment

# Definitive Interconnection Study Process- Enrollment

- The Definitive Interconnection Study Process consists of a clustered Definitive Interconnection System Impact Study (DISIS) and individual interconnection facilities studies.
- Enrollment- To enter the clustered DISIS, customers must submit a **valid interconnection request** before the close of the window. One **window will be opened annually**. Each window will be open for a 180 day period opening on October 1.

# Definitive Interconnection Study Process- Enrollment

- Requirements for a valid IR:

- (1) non-refundable application fee of \$5,000 and a study deposit\*;
- (2) a completed application, including applicable technical information needed for modeling;
- (3) a demonstration of site control;
- (4) a point of interconnection;
- (5) the point of delivery;
- (6) the generating facility size in MW;
- (7) the first readiness milestone (or financial security in lieu of the readiness milestone); and
- (8) financial security equal to (and in addition to) the study deposit.

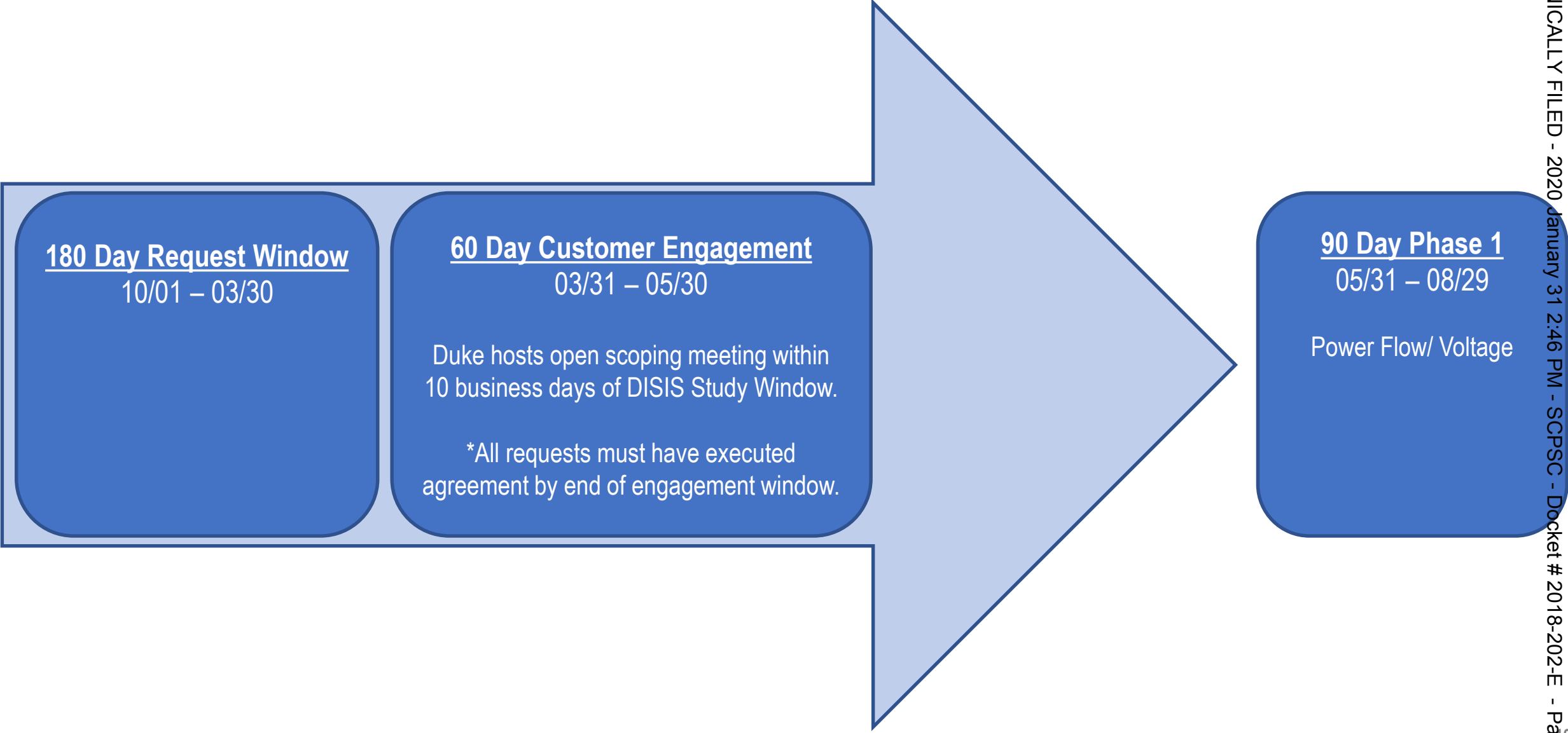
*\*Application fees and study deposits for exempt projects and the Fast Track process are still under consideration.*

# Definitive Interconnection Study Process- Customer Engagement Window

# Definitive Interconnection Study Process- Customer Engagement Windows

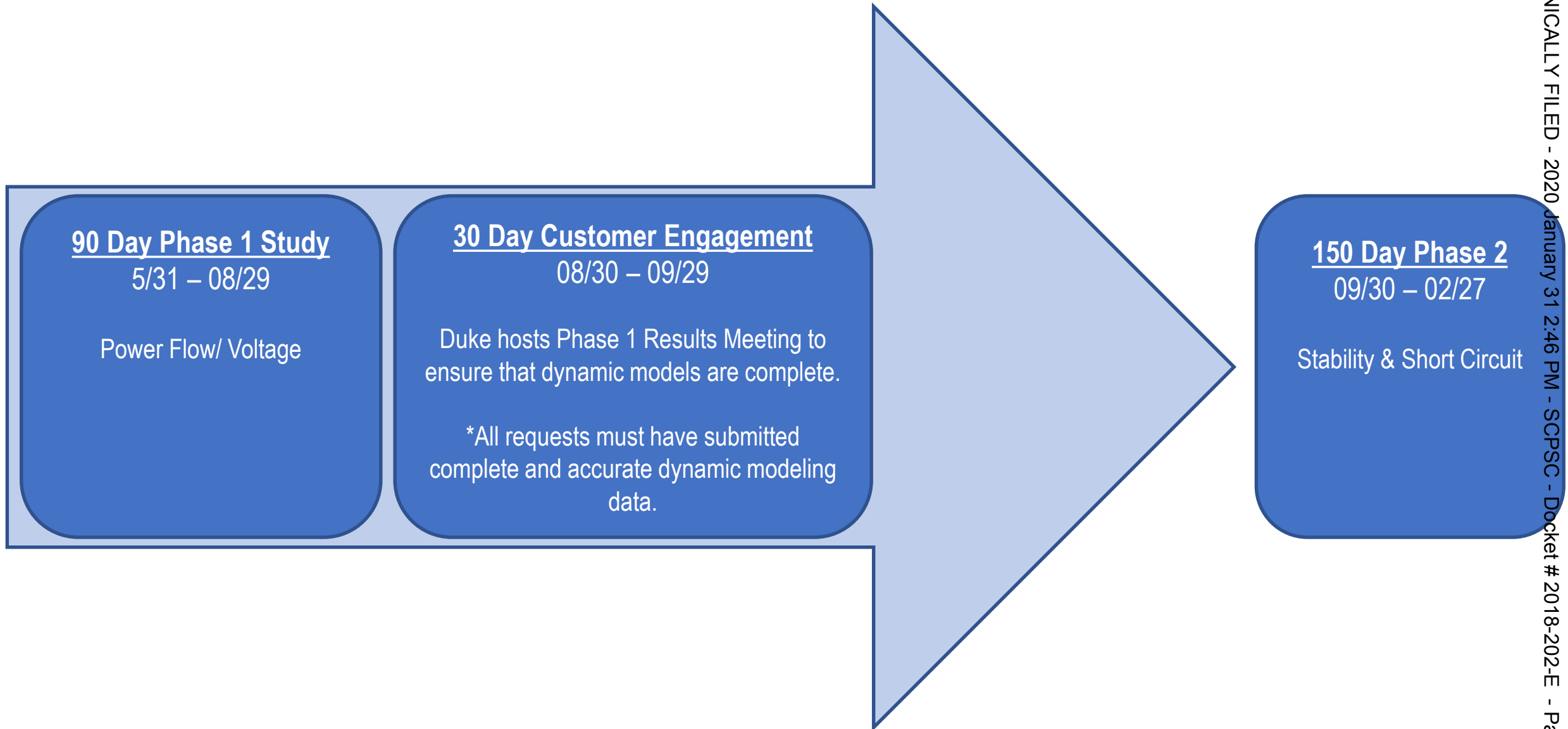
- Two Customer Engagement windows will be used to ensure complete applications and finalize modeling data for the required studies.
- After the enrollment window closes, a **first customer engagement window** will open for 60 days and close before the start of the Definitive Interconnection Study Process for each cluster.
- During this window, Duke Energy will work with interconnection customers to build models, verify data, hold stakeholder meetings, and generally prepare for the DISIS.
- Duke Energy will publish a list of all interconnection requests for that cluster to OASIS.
- In this phase, Customers will not have signed a study agreement (DISIS agreement), and any study deposits provided with the interconnection request will be fully refundable without penalty.
- After Phase 1 is complete, Duke energy will open a **second customer engagement window** for 30 days to ensure that information for dynamic models are complete and accurate.
- During this window, Duke Energy will work with interconnection customers to finalize dynamic models, verify data, hold stakeholder meetings, and generally prepare for the Phase 2 of the DISIS.
- Interconnection Customers that do not have a functional dynamic model for the Phase 2 study by the end of this engagement window will be withdrawn from the cluster and given the opportunity to participate in the next cluster study.

# Enrollment Window



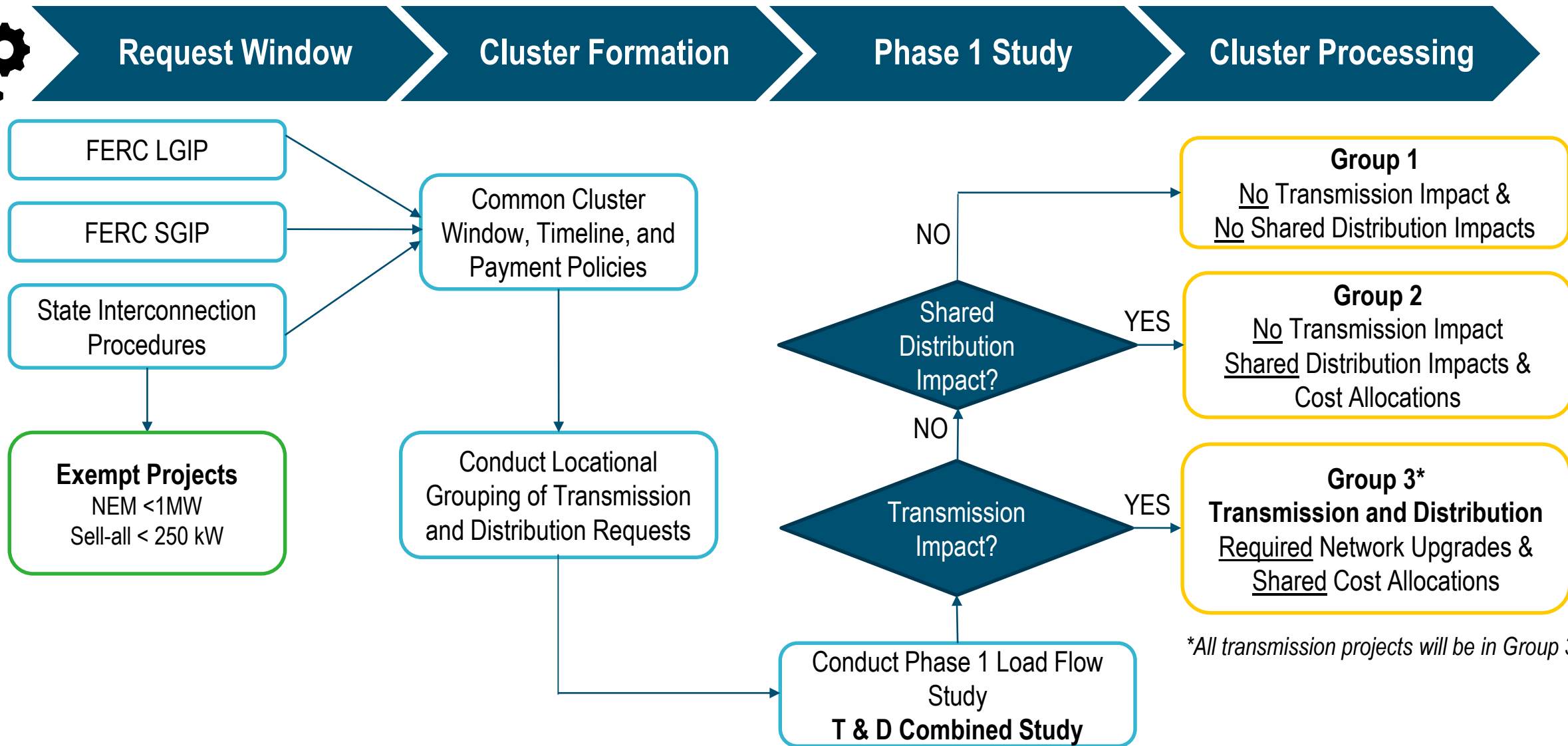


# Study Windows



# Definitive Interconnection Study Process

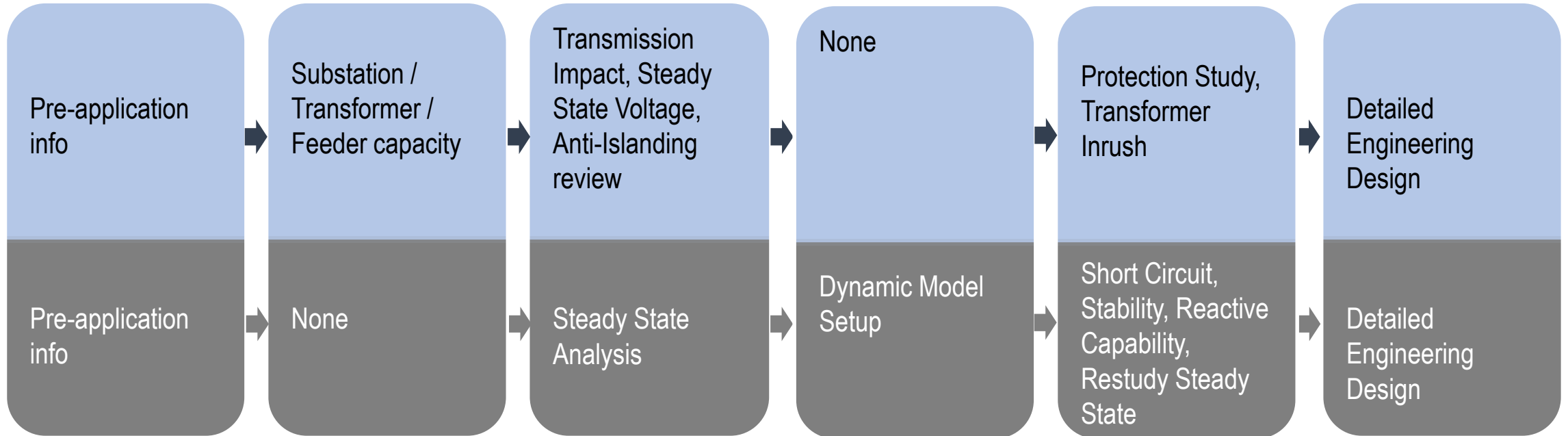
# Proposed Cluster Impact Group Determination



# Definitive Interconnection Study Process

- The Definitive Interconnection Study Process consists of three DISIS phases, followed by an individual interconnection facilities study phase.
  - **Phase 1** (90 days)- initial power flow and voltage study expected to identify the majority of required network upgrades. The results will provide the interconnection customer with an initial look at its costs to interconnect.
  - **Phase 2** (150 days)- a stability and short circuit study
  - **Phase 3** (90 days)- the individual interconnection facilities studies
- Demonstrations of readiness will be required in the form of readiness milestones before moving to the next phase.
- Restudy may be required due to withdrawals and will likely affect the Phase Timelines (i.e., the power-flow, voltage, stability, and short circuit analysis).

# Studies Conducted

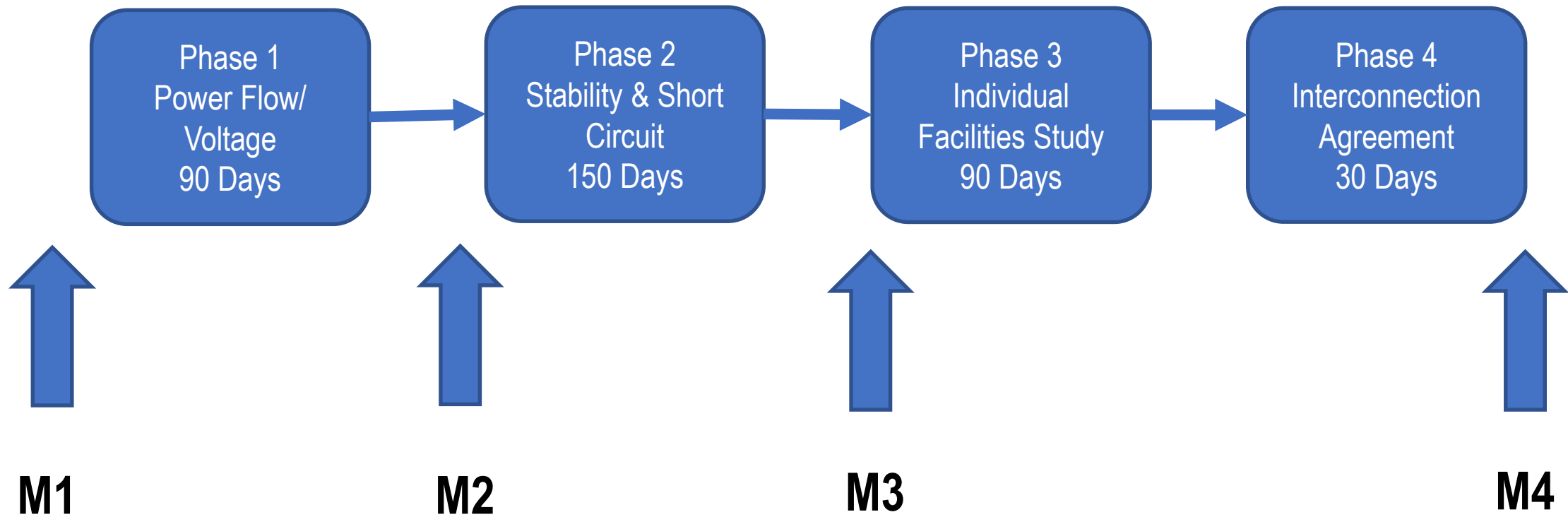


Distribution (D) SIS Screen/Study

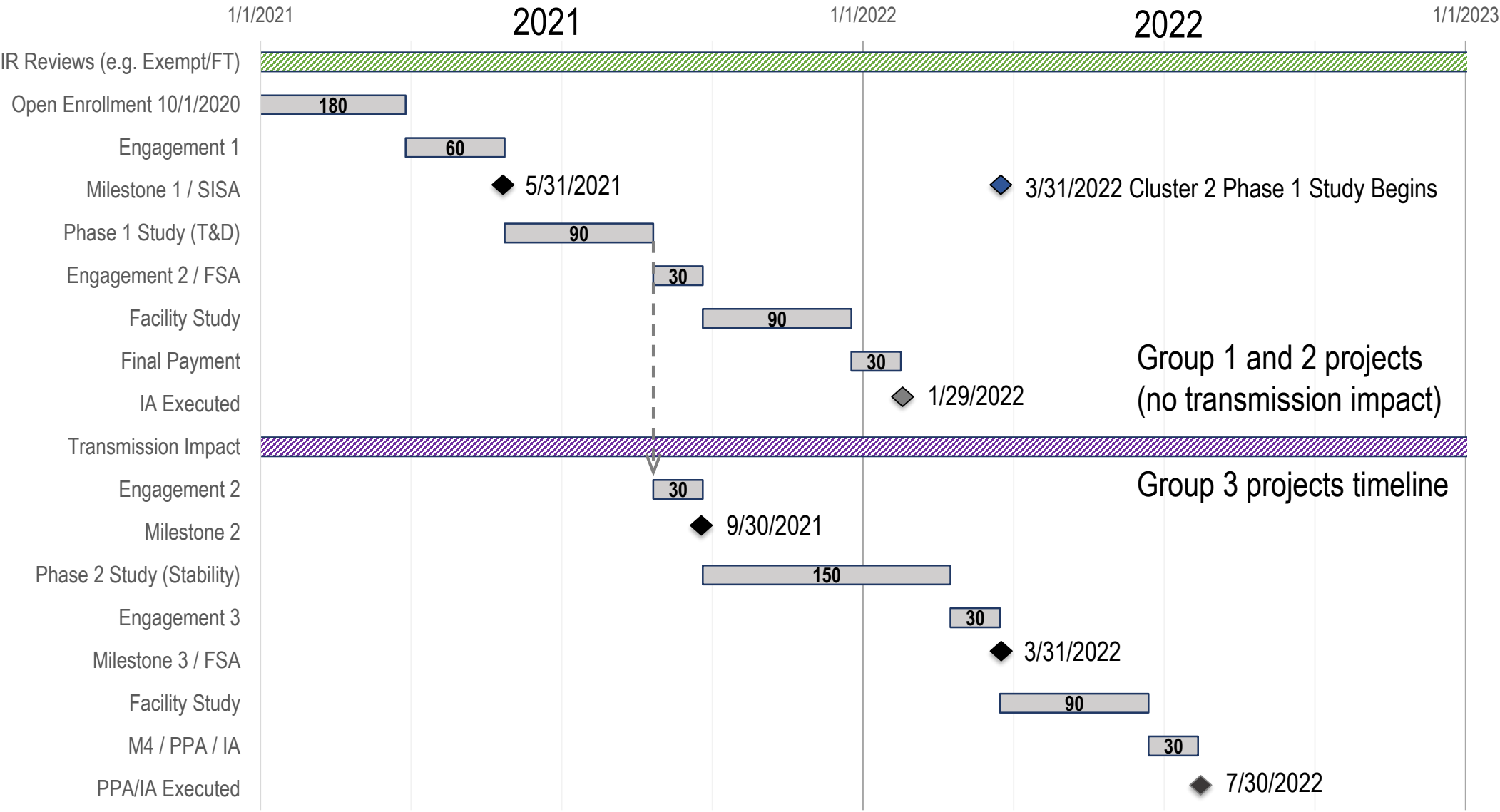
Transmission (T) SIS Screen/Study

# Definitive Interconnection Study Process-Timeline

# Definitive Interconnection Study Process



# Cluster 1 Timeline





# Cluster 1 Timeline

Day-Date	Year	Days	Activity
1-Oct	2020	180	Enrollment Window
31-Mar	2021	60	Engagement Window 1
31-May	2021	90	Phase 1 Study Window
30-Aug	2021	30	Engagement Window 2
30-Sep	2021	150	Phase 2 Study Window
28-Feb	2022	30	Engagement Window 3
31-Mar	2022	90	Facility Study
30-Jun	2022	30	IA

# CPRE Alignment

Cluster 1			
Day-Date	Year	Days	Activity
1-Oct	2020	180	Enrollment Window
31-Mar	2021	60	Engagement Window 1
31-May	2021	90	Phase 1 Study Window
30-Aug	2021	30	Engagement Window 2
30-Sep	2021	150	Phase 2 Study Window
28-Feb	2022	30	Engagement Window 3
31-Mar	2022	90	Facility Study
30-Jun	2022	30	IA



Competitive Procurement- Prospective Tranche 3			
Day-Date	Year	Days	Activity
29-Jan	2021	60	Bid Window
31-Mar	2021	60	Step 1 Evaluation- Selection Competitive Tier
31-May	2021	90	Step 2 Evaluation- Combined Upgrade & Energy Evaluation (Iterative)
30-Aug	2021	90	Contract Window

# Definitive Interconnection Study Process- Deposits

# Study Deposits

- An interconnection customer must make the following study deposits prior to entering the interconnection queue\*:
  - \$20,000 +\$1.00/kWac for requests < 20 MW; and
  - \$75,000 for requests  $\geq$  20 MW < 50 MW; and
  - \$150,000 for requests  $\geq$  50 MW < 200 MW; and
  - \$250,000 for requests  $\geq$  200 MW.
- Study deposits would be applied to the interconnection customer's share of the Definitive Interconnection Study Process costs.
- Study costs will be allocated to cluster study participants as follows: 10% based on the number of interconnection requests in the cluster; and 90 % based on the requested megawatts in the cluster.
- Differences between the actual cost of study and study deposit will be charged or refunded as applicable.

*\*Study deposits for exempt projects and the Fast Track process are still under consideration.*

# Transmission Cost Allocation

# Cost Allocation for Transmission Upgrades

- Identify constrained facility (thermal) and worst condition.
- Determine impact of projects on constrained facilities based on worst condition.
  - Calculate Distribution Factor **[MW Impact / Generator MW Rating]**
  - Calculate Loading Impact **[MW Impact / Applicable Facility Rating]**
  - Calculate MW Impact **[Distribution Factor x Generator Rating (MW)]**
- Projects with Distribution Factor < 3% and Loading Impact < 1% on constrained facilities exempt from cost allocation.
- Cost for the required thermal upgrades will be allocated based on the individual project MW Impact divided by the Total MW Impact for all projects subject to cost allocation.

# Distribution Cost Allocation

# Distribution Cost Determination

Cost allocation for distribution connected projects will be determined in **three** ways:

- Network Upgrade Cost
- Distribution System Upgrade Cost
- Interconnection Facilities



# Cost Allocation for Distribution Upgrades

Transformer/Substation Bank Upgrades	Per MW basis
Distribution Line Work (e.g. reconductor)	Per MW basis, based on location (% use of upgrade)
Distribution System Protection Upgrades	Per count of projects on feeder
Relaying Upgrades for Anti-Islanding Protection	Per count of projects on substation
Communication Medium for Anti-Islanding Protection	Per count of projects, based on location (% use of upgrade)
Interconnection Facilities	Direct assignment

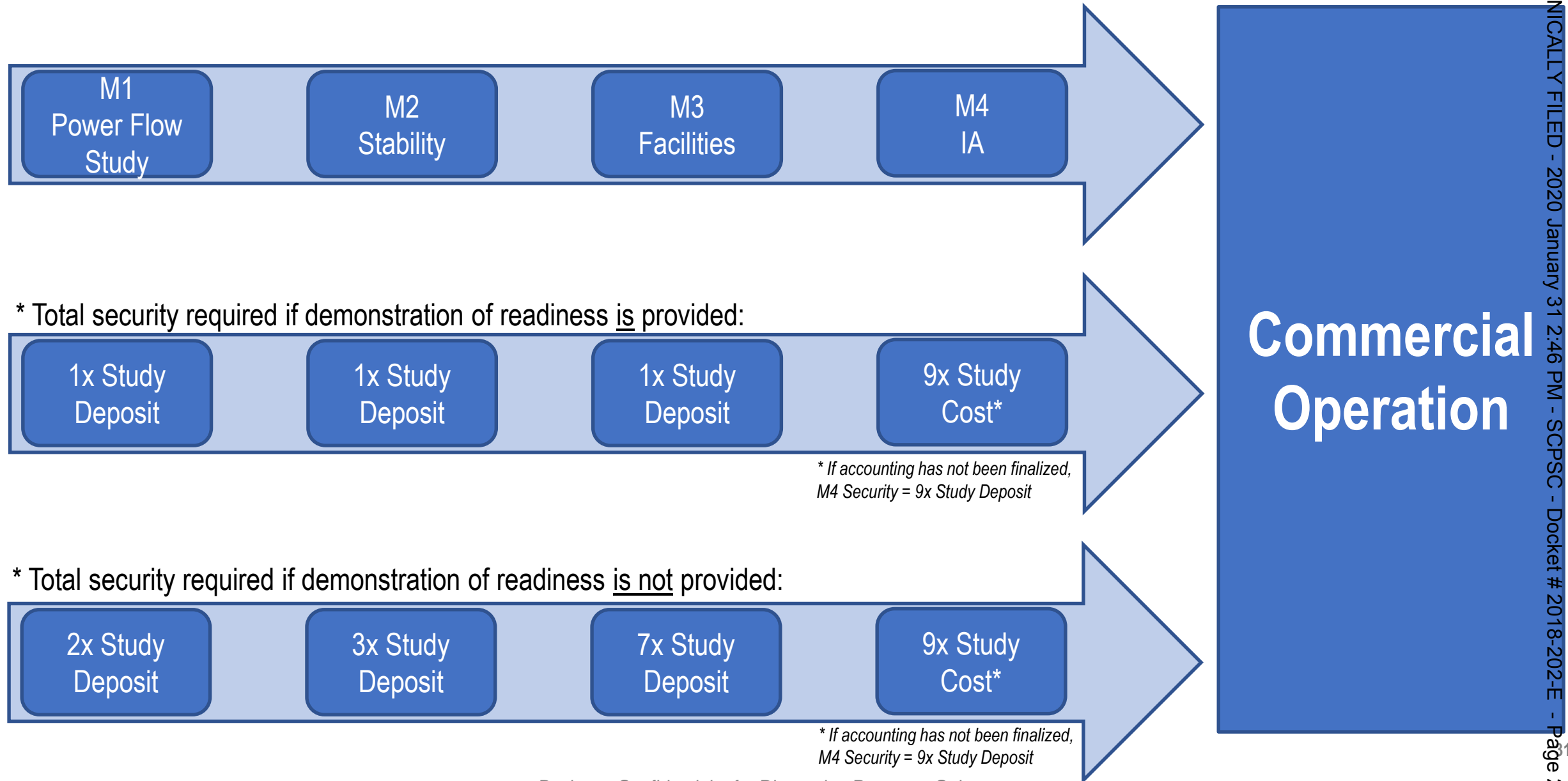
# Financial Security and Readiness Milestones

- All interconnection customers will be required to post **financial security** equal to the study deposit amount as part of a valid interconnection request.
- A series of **readiness milestones** will require completion to move through the Definitive Interconnection Study Process.
- Customers may provide the following **non-financial readiness demonstration options**: (1) Contract for Sale or Legally Enforceable Obligation, (2) Inclusion in a Resource Plan or Resource Solicitation Process, and (3) Provisional Service (FERC Only).
- Additional Financial Security- As an alternative to other demonstration options, **customers may also demonstrate readiness by providing additional financial security** in the amounts of one, two, and six times the study deposit for Milestones 1 through 3 respectively. This financial security is in addition to the financial security required as part of a valid interconnection request.
- **At Milestone 4**, all interconnection customers will be required to **provide financial security equal to nine times the interconnection customer's share of the Definitive Interconnection Study Process costs**.

# Financial Security and Readiness Milestones

- Contract for Sale/ Legally Enforceable Obligation- customer must provide executed term sheet or Notice of Commitment form to satisfy **Milestones 1 and 2**, and an executed contract to satisfy **Milestone 3**. The term sheet or Notice of Commitment form may be for the sale of the constructed generating facility, or the generating facility's energy to the Utility.
- Inclusion in a Resource Plan- customer must demonstrate it has been included in a Resource Plan to satisfy **Milestones 1 and 2**, and it has been included in a Resource Plan approved by the appropriate regulatory body to satisfy **Milestones 3 and 4**.
- Resource Solicitation Process- customer must demonstrate that it has been accepted into the competitive tier of the competitive solicitation process for **Milestones 1 and 2**, and that it has received a solicitation award from the independent administrator to satisfy **Milestone 3**.
- Provisional Service (FERC Only)- customer must demonstrate that it has filed an unsuspended Provisional LGIA, containing a commitment to move forward with constructing the facility, with the Commission to satisfy **Milestones 1 and 2**. The customer must also provide an unsuspended Provisional LGIA accepted for filing by the Commission, with reasonable evidence that the facility has commenced design and engineering to satisfy **Milestone 3**.
- Financial security provided both to enter the queue and to satisfy the readiness milestones will be refunded to the interconnection customer upon achieving commercial operation. If the interconnection customer withdraws prior to commercial operation, Duke will return the financial security after settling final invoices- including any applicable withdrawal penalty.

# Financial Security Required

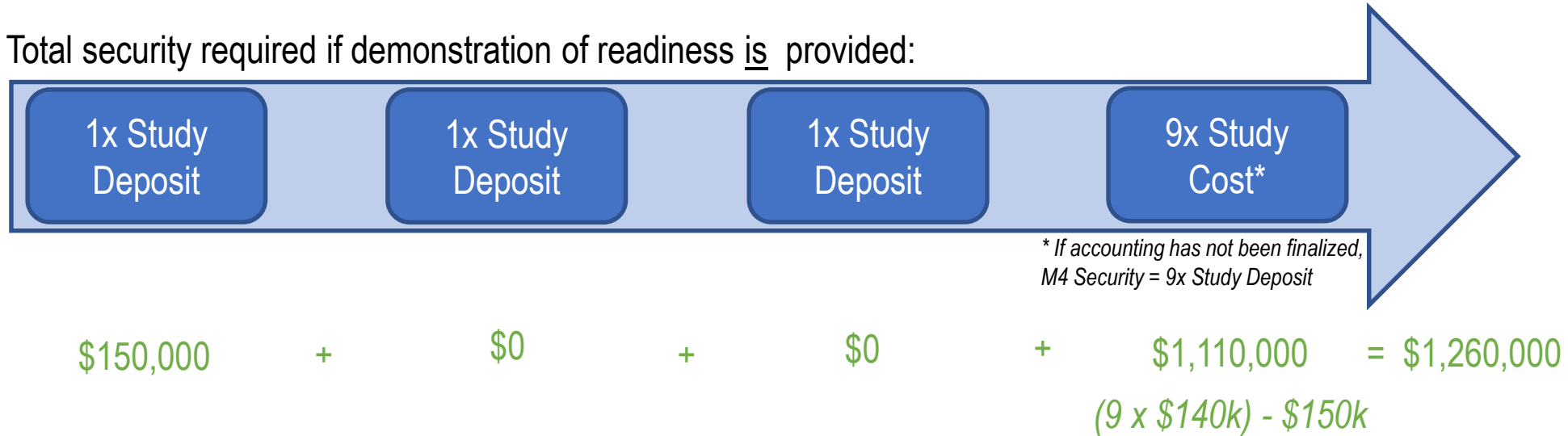


# Financial Security- Example #1



*100 MW Project, Readiness Provided, Study Deposit = \$150k, Study Cost = \$140k*

Total security required if demonstration of readiness is provided:



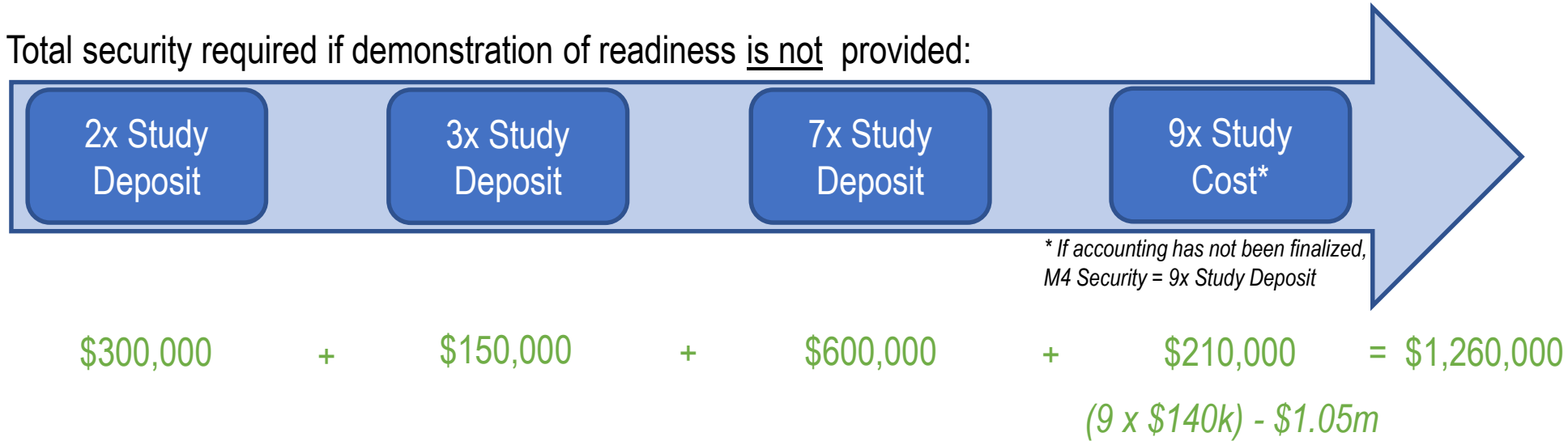
**Commercial  
Operation**

# Financial Security- Example #2



100 MW Project, Readiness Not Provided, Study Deposit = \$150k, Study Cost = \$140k

Total security required if demonstration of readiness is not provided:



Commercial  
Operation

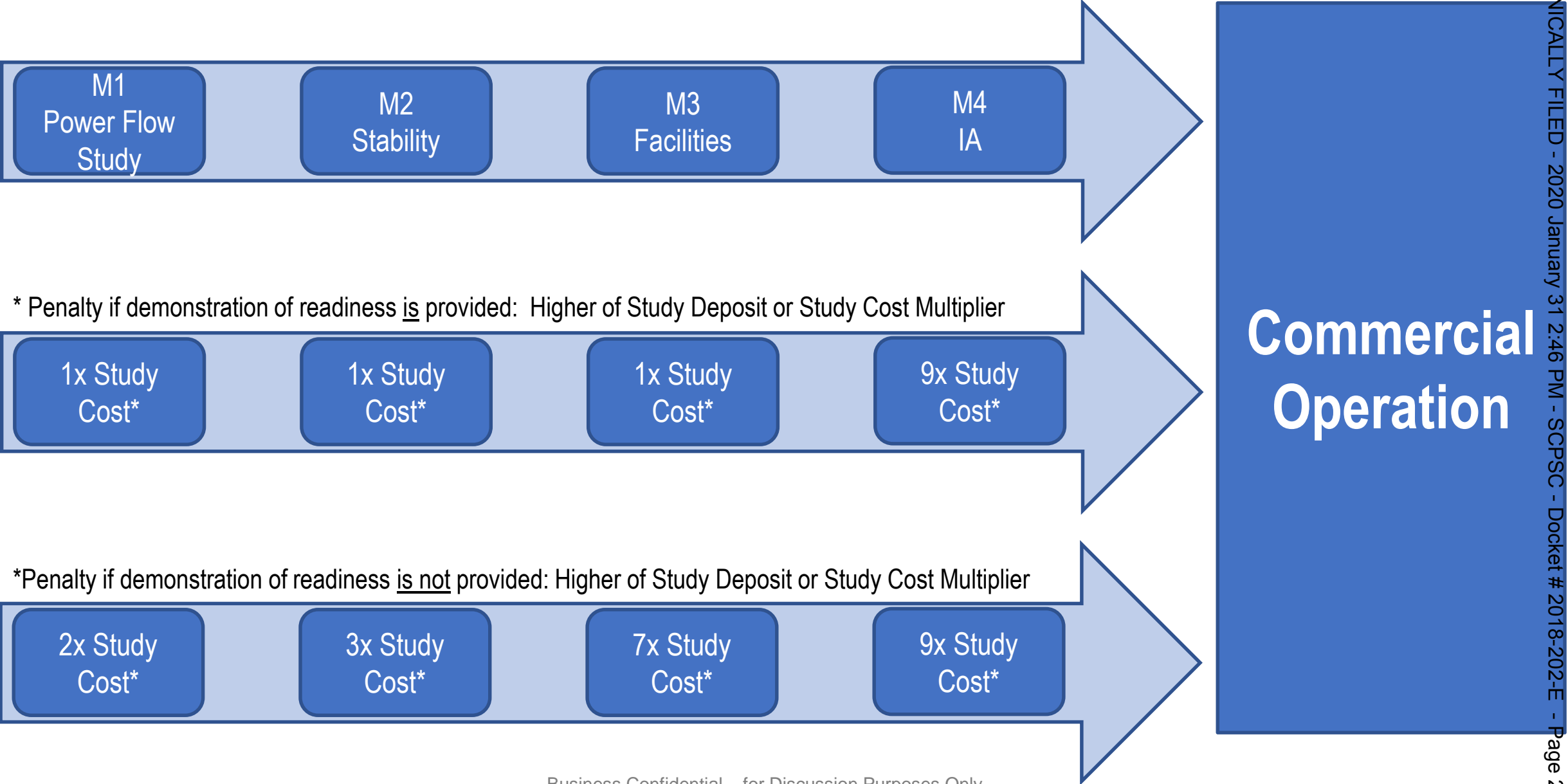
# Withdrawal Penalty



# Withdrawal Penalty

- Customers **will not** be subject to a withdrawal penalty if:
  - (1) the withdrawal does not **negatively affect the timing or cost** of equal or lower queued projects; or
  - (2) the cost responsibility for **transmission upgrades** identified for the withdrawing customer **increases more than 25 percent between Phase 1 & Phase 2 study reports**; or
  - (3) the cost responsibility for **transmission upgrades** identified for the withdrawing customer **increases by more than 100 percent between the Phase 2 and Phase 4 reports**
- If a withdrawal **negatively impacts** other customers *and* the **upgrade costs did not increase significantly between studies** or over the study process, the withdrawing customer(s) **will** be subject to withdrawal penalty dependent on the customer's performance of readiness demonstrations and phase of withdrawal (next slide).
- Withdrawal penalty revenue will be used to fund interconnection study costs for other interconnection customers in the same cluster as the withdrawing customer- 10 % based on the number of interconnection requests in the cluster and 90 % based on the requested MWs in the cluster.
- If withdrawal penalty revenues remaining after funding restudies for interconnection customers in the same cluster, Duke will retain the remaining penalty revenue for restudies of subsequent clusters. Duke will not use any portion of the withdrawal penalty nor use any of the withdrawal penalty to fund network upgrades. Duke will post the balance of the withdrawal penalty account on OASIS.

# Withdrawal Penalty

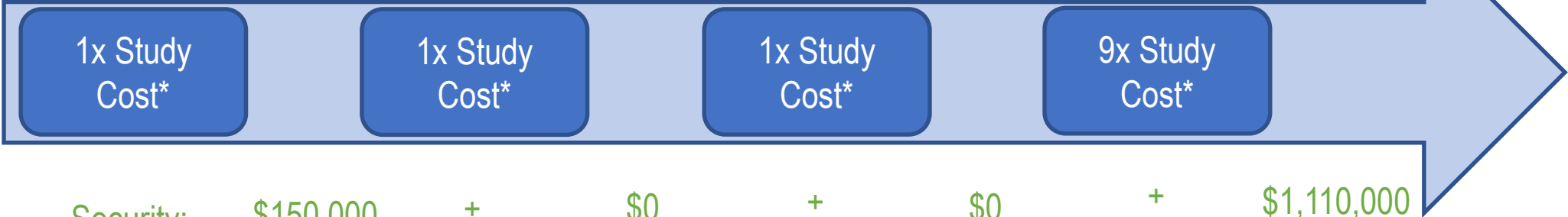


# Withdrawal Penalty- Example #1



100 MW Project M4 Withdrawal, Readiness Provided, Study Deposit = \$150k, Study Cost = \$140k

\* Penalty if demonstration of readiness is provided: Higher of Study Deposit or Study Cost Multiplier



Security:	\$150,000	+	\$0	+	\$0	+	\$1,110,000 (9 x \$140k) - \$150k
Penalty:	\$150,000		\$150,000		\$150,000		\$1,260,000

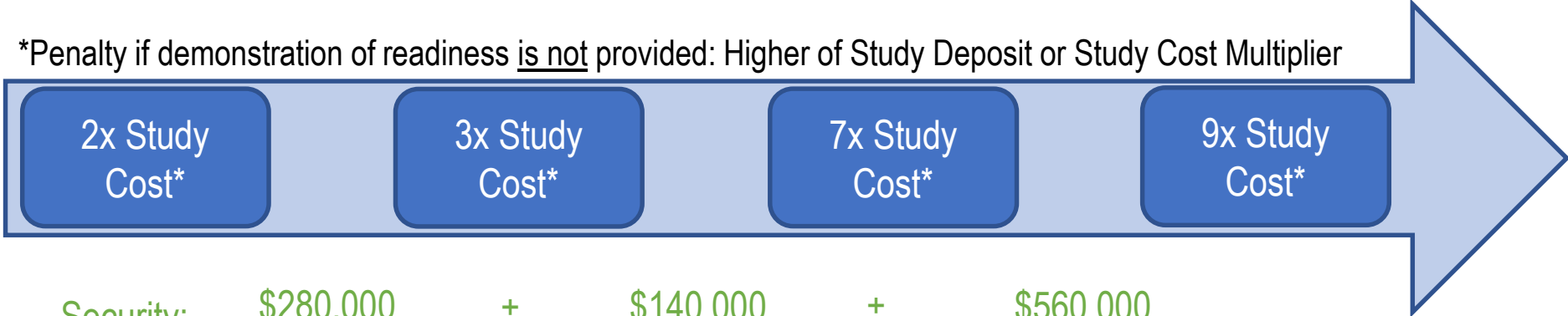
Commercial  
Operation

# Withdrawal Penalty- Example #2



100 MW Project M3 Withdrawal, Readiness Not Provided, Study Deposit = \$150k, Study Cost = \$140k

\*Penalty if demonstration of readiness is not provided: Higher of Study Deposit or Study Cost Multiplier



Security:      \$280,000      +      \$140,000      +      \$560,000

Penalty:      \$280,000      \$420,000      \$980,000

Commercial  
Operation

# Transition Process

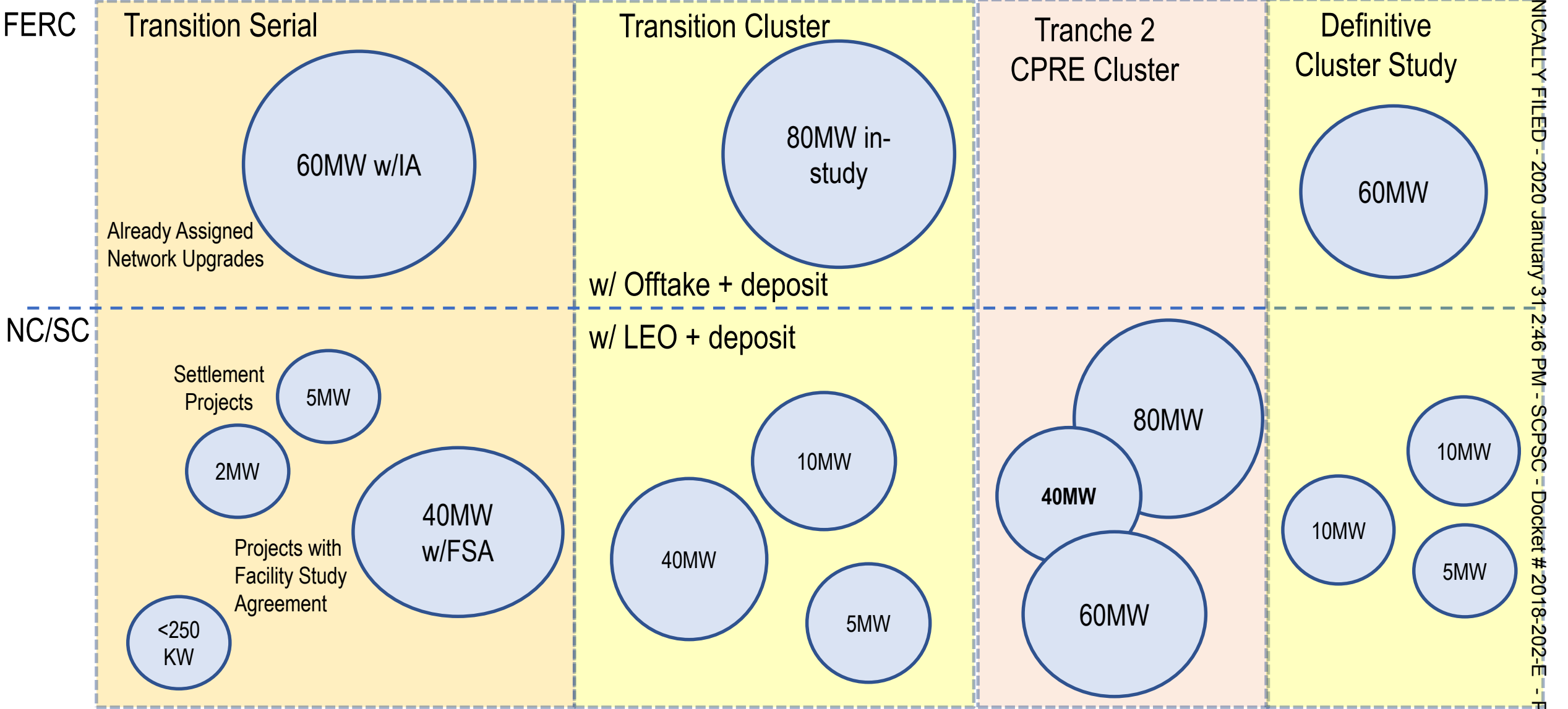
# Transition Process

- The following three options will be provided for projects in the current queue to transition into the first-ready, first-served process:
  - (1) the **transitional serial process**- customers with a final system impact study report and an interconnection facilities study agreement signed prior to September 27, 2020 are eligible to enter the transitional serial process
  - (2) the **transitional cluster process**- customers with an assigned queue position prior to September 27, 2020 are eligible to enter the transitional cluster process
  - (3) **withdrawal** from the queue and reentry into the queue in a future DISIS Cluster

# Transition Process

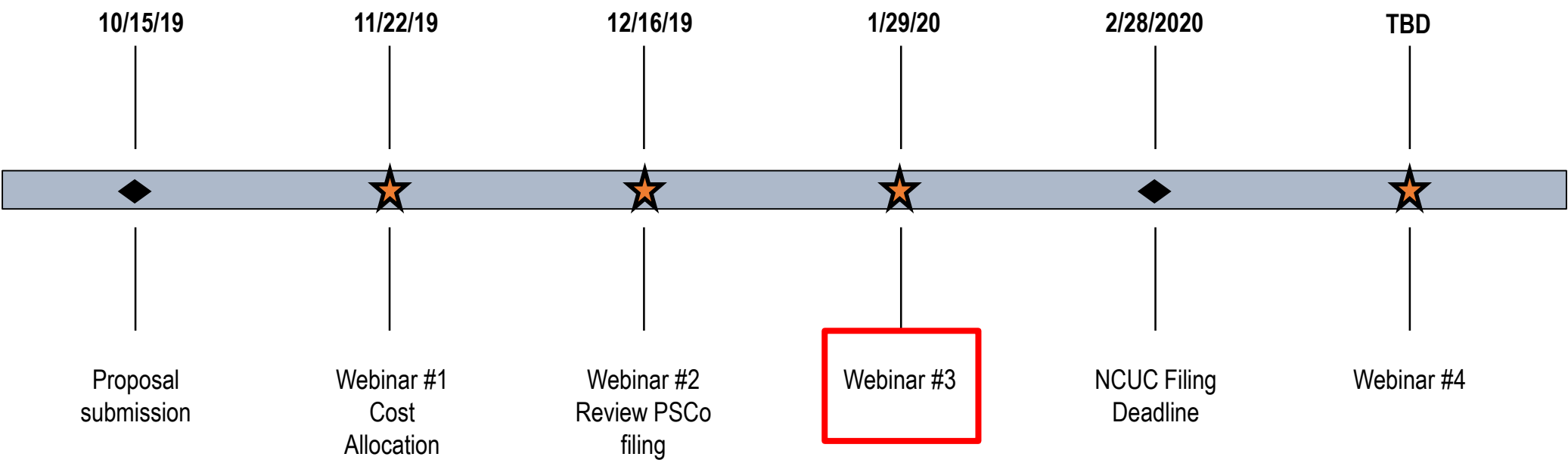
- In order **to enter the transitional serial or the transitional cluster process**, a project **must demonstrate readiness** by performing the following:
  - (1) providing a deposit for utility's interconnection facilities and network upgrades;
  - (2) demonstrating exclusive Site Control;
  - (3) signing a transitional interconnection agreement; and
  - (4) providing one of the following: (1) an executed contract for sale of the generating facility or its energy, where the term of the sale is not less than five years, or Legally Enforceable Obligation; (2) evidence that the generating facility is included in an approved Resource Plan or Resource Solicitation Process; or (3) an unsuspended, filed Provisional LGIA (FERC Only) that includes a commitment to construct the facility.
- Interconnection customers **must make this readiness demonstration during a 30 day window from the effective date of the tariff**. Customers that are not fully ready to proceed on January 6, 2021 will have the option of reentering the queue through the first regular DISIS Window, which will be open from October 4, 2020 through April 1, 2021.
- Customers entering the transition processes will be required to **make study deposits for 100 % of the costs identified in the system impact study report for the serial transition process, and \$4 million for transmission projects and \$800,000 for distribution >2 MW, to be reconciled with the costs determined in the transitional cluster study for the transitional cluster process**. If the interconnection customer withdraws or otherwise does not reach commercial operation, Duke will refund the deposit after the customer has paid the study costs and the withdrawal penalty equal to nine times the interconnection customer's total study costs.

# Serial-to-Cluster Transition Period





# Implementation Timeline\*



\*This timeline may be adjusted based on filing requirements